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REVIEW OF PROGRESS ON WATER-RELATED ISSUES

Water resources: progress in the implementation of the Mar del Plata Action Plan and of Agenda 21 on water-related issues

Report of the Secretary-General

SUMMARY

The present report to the Committee on Natural Resources at its second session has been prepared in accordance with Economic and Social Council resolution 1993/302. The report endeavours to provide an updated overview of conditions prevailing with regard to the assessment, development and use of water resources in the context of the interrelation between population, land and water resources, and the constraints with regard to sustainable development arising from widespread poverty. The report indicates that water shortages are becoming a common occurrence in industrialized and developing countries alike, and that the world may be reaching a water crisis situation of global proportions.

With regard to water resources assessment, this report concludes that serious problems persist in developing countries. With regard to water supply and sanitation, the report voices serious concern about trends in water-supply coverage in urban and rural areas of Africa, and about urban sanitation in Africa and both urban and rural sanitation in Asia. The available information also suggests that Governments are subsidizing services to the better-off population at higher levels rather than to the urban low-income population and

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rural areas, and that priority investment continues to flow into the urban sector, the bulk of it being directed towards the better-off population. As far as water for agriculture is concerned, this report presents estimates for the expansion of agricultural production to the year 2000, as well as cost figures related to those estimates.

As regards the management of water resources, the available information suggests that while a number of countries are endeavouring to implement recommendations stemming from Agenda 21, 1/ organizational fragmentation and lack of integration with the economic planning process persists. This report concludes by suggesting that if significant progress in all areas of water resources assessment, development and management is to be achieved, Governments need to give attention to the establishment of a dynamic interactive, iterative approach to water resources management, and that Governments that have not done so need to undertake a diagnostic assessment of their institutional arrangements and human resources capacity as a first step towards formulating a strategy and action plan for the years to come.

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INTRODUCTION

1. The present report is submitted to the Committee on Natural Resources at its second session in accordance with Economic and Social Council resolution 1993/302, in which the Council approved the provisional agenda and documentation for the second session of the Committee.

2. Given the short time that has elapsed since the United Nations Conference on Environment and Development, and the even shorter time that has elapsed since the first session of the Committee on Natural Resources, little new information is available that would permit an in-depth evaluation of developments and trends in response to the relevant recommendations of the United Nations Conference on Environment and Development as contained in chapter 18 of Agenda 21. 1/ At the time of the writing of this report, some countries had provided information concerning the implementation of chapter 18 of Agenda 21 in their country reports in connection with the second session of the Commission on Sustainable Development. Some additional information was obtained from the regional commissions and from various organizations of the United Nations system.

3. This report provides an updated overview of conditions prevailing with regard to the assessment, development and use of water resources as background for the consideration of specific policies and programmes that may be required to implement the recommendations of the Mar del Plata Action Plan 2/ and those of chapter 18 of Agenda 21. To the extent that information is available, the report also endeavours to provide information about recent institutional responses to Agenda 21, and policy developments that indicate the emergence of new approaches to pressing water resources development and management issues.

I. CRITICAL ISSUES FOR THE 1990s

A. Poverty, development, land, urban growth, water and population

4. The concept of water as a finite and vulnerable resource stands out as the very basis of the International Conference on Water and the Environment, held in Dublin, Ireland, in January 1992, and of chapter 18 of Agenda 21. The importance of that concept can best be grasped through the observation by the World Commission on Environment and Development that global water use, which had doubled between 1940 and 1980, would redouble by the year 2000, and that some 80 countries, with 40 per cent of the world population, were already suffering from serious water shortages. 3/ The world population, which in 1990 totalled 5.3 billion people, is expected to increase by approximately 1 billion people by the year 2000. Approximately 93 per cent of the increase will take place in developing countries, particularly in Asia (61 per cent) and Africa (23 per cent).

5. The bulk of the population increase is taking place in urban areas. In fact, in Latin America and the Caribbean as a whole, and in the more developed regions, rural population is expected to decrease. In Asia, approximately 73 per cent of the total population increase will take place in urban areas, while in Africa the corresponding estimate is 54 per cent.

6. The magnitude of the problem concerning urban growth in developing countries is indicated by estimates that show that while in 1980, 19 of the 30 largest urban agglomerations were located in developing countries, by the year 2000 the total is expected to increase to 22, with each having an estimated population ranging between 6.7 million and 22.6 million people. While there were 2 cities in Asia (including Japan) with a population exceeding 10 million in 1980, there were 7 such cities by 1990, and it is estimated that their number will grow to 13 by the end of the century. The number of people in Asia living in those mega-cities by the end of the century will be over 5.5 times larger than in 1980. The number of inhabitants in cities with 1-5 million people will more than double, and the number of those living in cities with 1 million people or less will nearly double. By the year 2000, some 24 million people in Africa will be living in one or the other of two cities with population exceeding 10 million, and the population in cities with 1-5 million people will have grown by more than 350 per cent since 1980. In Latin America and the Caribbean, the population living in cities with 500,000-1 million people, 1-5 million people or over 10 million people will more than double over this 20-year period.

7. As mentioned in the report of the Secretary-General to the former Committee on Natural Resources at its twelfth session, held in 1991 on strategies and measures for the implementation of the Mar del Plata Action Plan in the 1990s (see E/C.7/1991/8, para. 16), the availability of safe water in urban centres is fast becoming one of the most important factors limiting socio-economic development, and is a crucial indicator of the quality of life in urban development. The rapid growth of urban centres also brings with it a general demand for more food production, with its implications of intensified cropping and increased competition and conflicts among various water uses.

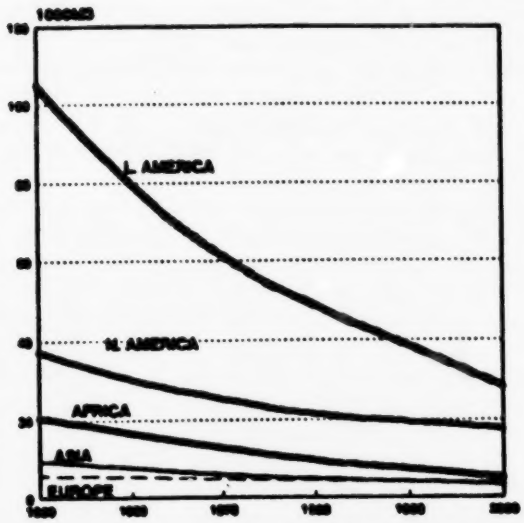
8. The pressures on land and water resources from increased urbanization and increased demand for food production are illustrated by estimates of the Food and Agriculture Organization of the United Nations (FAO) that 110 million hectares (ha) of land with agricultural potential in all developing countries, excluding China, will need to be claimed for human settlements and agricultural use by the year 2010. FAO further states that while these requirements would appear to be small when compared with a figure of 1.8 million ha. of land with agricultural potential not occupied by either of these two uses, "land scarcities are very acute in some countries and regions, namely South Asia and Near East/North Africa. Even the small increases foreseen for them are a significant part of their still unused land. For example, the increments for these two uses would claim about 40 per cent of the still unused land with agricultural potential in South Asia". 4/ FAO further estimates that, "additional land for agriculture in South Asia will be needed even after allowing for further intensification. The latter could raise cropping intensities from 100 to 120 per cent and double the fertilizer use rate per ha". 5/ FAO concludes that constraints vis-à-vis the availability of water for agriculture will be even more severe than land constraints. According to FAO, "the increasing claims on agricultural land for non-agricultural uses are minor when compared with those placed on water resources, because the per caput non-agricultural use of water tends to rise very rapidly with urbanization and industrialization". 6/

9. While in the past there was a tendency to regard water problems as being local or regional in nature, there is now a growing recognition that their increasingly widespread occurrence is quickly adding up to a crisis of global magnitude. As shown in figure I, water scarcity relative to demand is no longer a problem in arid or semi-arid areas alone, but is now a common occurrence in both developed and developing countries alike. Furthermore, the waste/assimilative capacity of freshwater bodies adjacent to many urban agglomerations is being outstripped, and there are few parts of the world that are still exempt from problems of degraded water quality and the pollution of surface or groundwater sources.

10. In Agriculture: Towards 2010, FAO states that overextraction of groundwater, while most acute in the Near East, is a growing problem in many areas, and is also a problem in large areas of South Asia, where food is heavily dependent on irrigation. According to FAO, "overpumping in these areas is causing water levels to fall beyond the reach of shallow tube wells, with the risk that irrigation may eventually become too expensive or physically impractical". 7/

Figure I. Per capita water availability, by region, 1950-2000

(Thousands of cubic metres)



Source: Aylbotsin, M.S., The Worlds Water: Assessing the Resource. Keynote paper at the International Conference on Water and the Environment, Dublin, Ireland 1992.

11. Under pressure from population and economic growth, it is expected that problems related to food production will be exacerbated by a deterioration of water quality, and a degradation of existing irrigation systems to the point where they have to go out of use. Degradation of soils is estimated to affect some 1.2 billion ha of land world wide, of which 450 million ha are in Asia, 320 million ha are in Africa, 227 ha are in the American continents and 158 million ha are in Europe. Deforestation and overgrazing are each estimated to account for about one third of the total area affected, while the bulk of the remaining area affected is attributed to mismanagement of arable land. 8/

12. While problems are becoming increasingly global in scope, their solutions are far from uniform, depending on the level of income of the population. For a large part of the world, the issue of sustainable land and water resources development is intimately related to that of poverty. To the very poor, who may barely eke out a living in rural or periurban areas, concerns about the degradation of the environment, if any, will take a back seat to concerns about day-to-day survival. The modern sector and mass poverty coexist in the vast majority of developing countries. Both elements bring with them obstacles to the sustainable development of land and water resources. Without a concerted effort to deal with economic growth, poverty and a more equitable distribution of income, developing countries will not be able to cope with issues related to the long-term sustainability of land and water development. Sustainable land and water resources development is inextricably linked to the formulation of socio-economic policies and programmes aimed at economic growth and poverty reduction.

B. Water resources assessment

13. Water resources assessment of surface water and groundwaters, including their quantity and quality, remains an essential prerequisite of the sustainable development and management of water resources. It is fundamental to virtually every use of water, whether that use be for drinking-water supply or irrigation, hydropower production, or the dilution and carriage of wastes. In addition, the data produced contains signals regarding how sustainable the activities are that are carried out around the basins being sampled. Yet at a time when demands for water are rising rapidly and the need for sustainability is gaining increasing recognition, hydrologic services, particularly in the developing countries, are becoming less capable of assessing national water resources.

14. A description of issues and recommendations concerning water resources assessment is contained in the report of the Secretary-General to the former Committee on Natural Resources on strategies and measures for the implementation of the Mar del Plata Action Plan in the 1990s at its twelfth session (E/C.7/1991/8). That report was based on the findings of regional surveys carried out by the World Meteorological Organization (WMO) and the United Nations Educational, Scientific and Cultural Organization (UNESCO) as part of a United Nations Development Programme (UNDP)-financed project to assess progress in the implementation of the Mar del Plata Action Plan. A more detailed description of the findings is contained in the WMO/UNESCO report entitled "Water resources assessment: progress in the implementation of the Mar del Plata Action Plan and strategy for the 1990s".

15. Since the 1991 report of the Secretary-General, there has been little evidence to indicate that major positive changes have taken place or that progress has been achieved. The situation in Africa continues to be critical. The UNDP-financed World Bank project aimed at evaluating the status of existing hydrologic data-collection systems of the countries of the Southern African Development Community (SADC) concluded that "the overriding constraints are financial and managerial. Few countries now have services which can be compared favourably with those existing 10 and 20 years ago. No country has a service which is adequate as a basis for sustaining the many water developments which can be expected in the region in the coming decades". 9/ The study went on to conclude that "manpower is rarely sufficient to allow data-collection agencies to meet their obligations, with establishments being too small and manpower skills insufficient for the workload". 9/ Latin America and the Caribbean, as well as Asia and the Pacific, continue to face considerable problems. In addition, conditions in Eastern Europe and successor States of the former Union of Soviet Socialist Republics (USSR) have recently worsened to the extent that many nations in Eastern Europe and Central Asia have suffered serious reductions in their hydrologic services.

16. The above-mentioned WMO/UNESCO regional assessment indicated that there was a direct relationship between levels of economic development, the importance attached to water resources assessment and the budgetary resources allocated for that purpose. In general, however, water resources activities tend to lack sufficient recognition in developing countries even at relatively high levels of per capita income. According to one author, "there seems to be little recognition that the design and operation of projects involves more risk the less hydrological data are applied to them." 10/ In this respect, the situation is particularly acute in Africa.

17. In response to the needs expressed by the International Conference on Water and the Environment and the recommendations contained in chapter 18 of Agenda 21, UNESCO and WMO, with the support of the World Bank, are promoting a major long-term initiative to improve knowledge of the hydrologic cycle through the development of a World Hydrological Cycle Observation System (WHYCOS). The initiative aims to alleviate the deficiencies that exist at the national, regional and global levels with respect to data required for effective water resources management and sustainable development. The proposal envisages the creation of a world-wide network of key stations linked by satellite with an associated quality-controlled database. WHYCOS would employ existing measuring stations where these met specifications, as well as upgraded and new ones. The WHYCOS network envisages the measuring of river flow and water-quality variables, as well as on-bank temperature, humidity, radiation, wind speed, barometric pressure, precipitation and several related variables. The proposed WHYCOS programme would employ the existing WMO World Weather Watch system where applicable, and would in turn contribute data to it, as well as to the Global Climate Observing System (GCOS) and to the Global Terrestrial Observing System (GTOS).

18. The initial focus of attention of the WHYCOS programme would be in Africa, in view of the seriousness of the situation in the African region. The estimated funding needed for this purpose would be about US$ 14 million for the initial 6-year period of a 20-year programme. Similar approaches are being

developed for Latin America and the Caribbean, for countries bordering the Mediterranean Sea and for the basin area of the Aral Sea.

C. Drinking-water supply and sanitation

19. Improved information concerning water supply and sanitation coverage at the country level is being obtained through the WHO/UNICEF Joint Monitoring Programme, which aims to assist Governments in monitoring their water and sanitation sectors. The Programme has yielded improved information in 82 countries, and permitted some update of the information presented to the General Assembly at its forty-fifth session in the report of the Secretary-General on the achievements of the International Drinking Water Supply and Sanitation Decade, 1981-1990" (A/45/327).

20. Based on the information received by the Joint Monitoring Programme from countries in the African region, the percentage of the urban population with safe water-supply and adequate sanitation in 1990 was significantly lower than had previously been estimated. More than 25 per cent of the people in Africa have no access to safe water-supply, and more than 40 per cent do not have adequate sanitation. Under such conditions, the lack of coverage expected by the year 2000 becomes alarming. The newly reported figures for rural water-supply, representing about 59 per cent of the total rural population of the region, also indicate a lower coverage than had been reported initially (35 as against 42 per cent). By contrast, the percentage of rural inhabitants with adequate sanitation appears to be higher (33 as against 26 per cent).

21. In the case of the region of Asia and the Pacific, the new data indicate that in urban and rural areas there is a higher proportion of people with safe water-supply than was reported initially (83 as against 77 per cent, and 74 as against 67 per cent, respectively), but there is a lower proportion of people with adequate sanitation services (62 as against 65 per cent, and 49 as against 54 per cent, respectively). Consequently, the decreasing trend in relative urban sanitation coverage by the year 2000 remains a cause for serious concern. The number of countries providing information in the region of Latin America and the Caribbean and in Western Asia do not constitute a sufficiently representative sample of the regions' total population to allow a revision of the previous data.

22. With regard to levels of funding for operation and maintenance, the 1993 report of the Joint Monitoring Programme indicated that it had been found that "Governments are subsidizing water systems and sanitation services to the better-off populations by around 70 per cent of recurrent costs, as compared to approximately 50 per cent towards the lower levels of service provided to the urban low-income and marginal areas, and less than 40 per cent of the much lower operation and maintenance costs (O & M) in the rural areas". 11/ It was also noted that "in urban areas, Governments provide a larger proportion of the costs of running the systems than either the communities themselves or the external support agencies. Communities appear to contribute most to O & M in rural areas where external support agencies are also most active". 11/ In terms of funds allocated to operation and maintenance, the Joint Monitoring Programme has found that, even though information is meagre, "it is clear that unless funds are

increased significantly, systems sustainability will not be attained in most instances". 11/

23. The report of the Joint Monitoring Programme also dwells on the differences in service levels provided to populations with high-income and low-income levels. According to the Programme's findings, globally about 40 per cent of the population with access to safe water-supply have in-house connections. Of these, 64 per cent are high-income urban dwellers (constituting about 80 per cent of the total in this class), about 10 per cent are categorized as belonging to the low-income urban class (less than 20 per cent of low-income residents), and about 26 per cent are rural dwellers (less than 5 per cent of the rural residents provided with safe water). In addition, approximately 8 per cent of the total population are supplied through yard taps, 13 per cent through public standposts and about 39 per cent through protected dug wells, and boreholes with hand pumps. 11/

24. With regards to funding, the preliminary data obtained through the Joint Monitoring Programme leads to the conclusion that "priority investment in water supply and sanitation has continued in the urban sector. Moreover, the bulk of this funding has been directed towards the better-off population". 11/

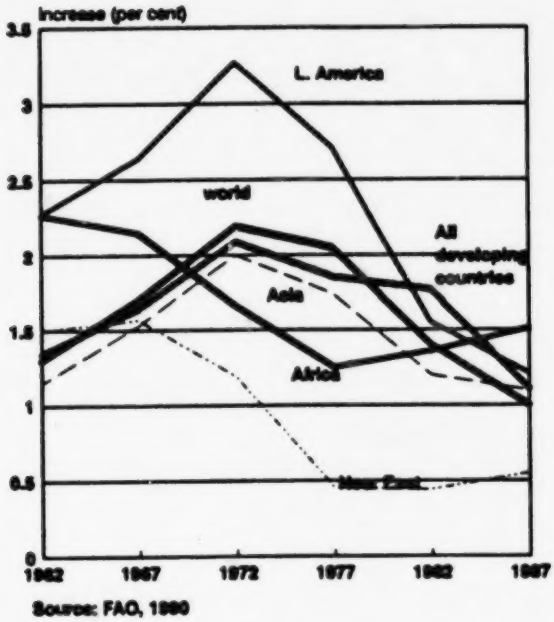
D. Agricultural water use

25. During the 1960s and 1970s, large-scale irrigation developments dominated efforts to bring new lands under irrigation. Often linked to flood control and hydropower generation, these schemes were developed with great enthusiasm and pride. The availability of water and land resources, favourable markets for agricultural products, the low cost of construction and relatively easily available external funds made those developments possible. Since the 1980s, however, many of these conditions have changed and this has resulted in a declining trend with respect to irrigation expansion.

26. During the past four decades, irrigated agriculture was responsible for a major part of the increase in production to meet population demands. By the mid-1990s, 36 per cent of the total crop production is expected to come from less than 15 per cent of the arable land that is irrigated. On a global basis, the average rate of expansion was about 1.5 per cent per year in the early 1960s, reaching a maximum of 2.3 per cent per year in the period 1972-1975. The rate of expansion began to decrease in the mid-1970s and is currently about 1 per cent per year (see figure II).

27. FAO reports that one of the most common causes for the decline in the rate of expansion was the high cost of irrigation. Construction costs have risen steadily and world prices for major cereals have fallen sharply. Furthermore, as much of the suitable land for irrigation development and available water-supplies are already developed, progressively less favourable and therefore more expensive areas are left for further expansion.

Figure II. Rate of increase in irrigated land, 1962-1987



28. FAO's projection (World Agriculture Towards 2000) 12/ of the expansion of irrigated land to the year 2000, based on previous trends and modified by land, capital and inputs required to meet future needs, is 2.25 per cent per year from the period 1982-1984 to 2000. According to this study, between the period 1982-1984 and 2000 about two thirds of the increase in arable lands will be accounted for by expansion of irrigation. 13/ The projected rate for developing countries is 2.4 per cent per year. The World Bank estimates that although it will take an average annual growth rate of 2 per cent in agriculture as a whole to feed a world population estimated to reach 6 billion by the year 2000, and 8 billion by the year 2025, the growth rate for irrigated agriculture will need to be 3 per cent per year.

29. Specifically, China needs to increase its annual food production from 400 million to 500 million tons by the year 2000. 14/ This would require increasing the irrigated land area by 1.4 per cent annually; modernizing irrigated lands; reclaiming waterlogged lands; increasing water conservation; and increasing the reservoir fish-farming area. India's irrigation potential has been increasing at a rate of about 2 million ha per annum and by the end of the seventh 5-year plan (1986-1990), the developed potential was in the order of 79 million ha. During that time, India was able to increase its food production from 50 million to 170.63 million tons. 15/ Turkey's potential for irrigated agriculture is about 8.5 million ha. By 1990, 1.65 million ha were under

irrigation, with a further 750,000 ha projected by 1994. 16/ Egypt projects a 2 per cent increase (125,000 feddans) in irrigated land over a five-year period, and predicts a change in water use from 49.7 billion cubic metres in 1990 to 59.9 billion cubic metres in 2000. Mexico has 20 million ha of cultivated lands, of which 6 million ha are irrigated, 17/ contributing 50 per cent of total production, and had a projected increase in irrigated area of 1,125,000 ha by 1994 (a 4.6 per cent annual increase).

30. FAO's recent studies 18/ indicate that it will be difficult to sustain a 2.4 per cent annual growth in irrigation expansion in developing countries as predicted earlier. Clearly, a major portion of the needed increase in food production must come from existing irrigated and rain-fed lands through increasing yield per unit area and yield per unit of water consumed. Thus, FAO's International Action Programme on Water and Sustainable Agricultural Development puts emphasis on increasing water-use efficiency through modernization and improvement of existing irrigation schemes, rehabilitation of waterlogged and salinized irrigated lands and promotion of small-scale water programmes aimed at supplementary irrigation, water harvesting and soil moisture conservation in rain-fed arable lands. At the same time, however, expansion should continue at a rate that can be justified in terms of meeting the goals of food security, increased farm income, improved rural development and conservation of the natural resource bases.

31. FAO's recent projections for new irrigated lands up to year 2000, based on current trends and taking into account agro-climatic conditions and availability of suitable lands and water, are given in table 1. These increases are conservative, as compared with the expansion planned by several countries. They are the essential minimum rates that should be sustained if major starvation is to be avoided. Increases in production from these new lands will supplement a larger portion of food that is expected to be derived from existing irrigated lands through modernization and adoption of improved water management and crop husbandry practices; reclamation of waterlogged and salinized areas; and improved moisture management in rain-fed areas.

32. The cost of irrigation development varies from country to country and depends on the scale of development. Preliminary estimates by FAO indicate that the total cost for the development of 15.2 million ha in 130 countries from 1993 to 2000 would amount to US$ 6.5 billion per year. These estimates were made on a regional basis, using existing cost data and assuming that a majority of the future developments will be medium-scale.

Table 1. Projection of irrigation expansion in developing countries, and related costs, 1993-2000

	Total irrigated land - 1990	Projected increases	Unit costs	Total costs
	(Millions of hectares)		(US dollars)	(Billions of US dollars)
Asia (30 countries)	132.1	12.0	2 400	28.8
Near East (10 countries)	9.5	0.4	5 800	2.32
Latin America (40 countries)	16.3	1.8	4 000	7.2
Africa (50 countries)	14.2	1.0	7 200	7.2
Total (130 developing countries)	172.1	15.2		45.52

33. In order to achieve these objectives, FAO suggests that the scale of a new irrigation development should be appropriate to its being sustainable, with focus on medium-scale and small-scale developments, while large-scale developments must be considered as components of multiple-purpose projects. Regardless of size, the project area's basic water needs must be provided for, especially drinking-water and sanitation needs. All developments, however, must be subject to and must meet the stipulations of an environmental impact assessment at the planning stage before being pursued. In addition, during all phases of development, the relevant sectors of society should be involved and consulted, with especial importance being given to the involvement of women.

34. In most irrigation schemes, improvement to the physical system is important to increase water-use efficiency and to diversify cropping patterns. The modernization of existing irrigation projects is vital to increase yield, save water, make the project economically viable and arrest environmental hazards. This may involve, inter alia, canal-lining, additional and improved hydraulic control structures, better land development, and new irrigation methods. Targets and cost of modernization in 130 developing countries are presented in table 2. These estimates are based on the assumption that physical upgrading would amount to 10 per cent of the total irrigated area over a 10-year period, and that the cost of upgrading would amount to 25 per cent of the cost of new irrigation development.

Table 2. Estimated targets and costs for the modernization of existing irrigation schemes, 1990-2000

	Total irrigated area - 1990	Total area upgraded	Unit cost	Total costs
	(Millions of hectares)		(US dollars per hectare)	(Billions of US dollars)
Asia	132.1	13.21	600	7.9
Near East	9.5	.95	1 450	1.4
Latin America	16.3	1.63	1 000	1.6
Africa	14.2	1.42	1 800	2.5
Developing countries (130)	172.1	17.21		13.4
Developing countries (130) for the period 1993-2000		12.00		7.38

35. According to FAO, an estimated 20-30 million hectares, globally, are severely affected by salinity and an additional 60-80 million are affected to some extent. FAO suggests that reclamation should be pursued at a minimum rate of 1 million hectares per year between 1993 and the end of the century. The major cost of reclamation is to be found in the provision of artificial drainage, including farm drainage as well as main drains, and suitable disposal or reuse facilities. The estimated cost for the provision of such drainage facilities would amount to US$ 7 billion over the seven-year period.

36. Agricultural requirements in the years to come will require the intensification of production in high-potential rain-fed lands where intensification does not result in overexploitation of the natural resource base or in environmental degradation. Improvements in rain-fed lands are proposed by FAO in the context of soil moisture conservation and the enhancement of food production under traditional rain-fed farming conditions. A total area of about 10 million hectares would be improved within the period 1993-2000, constituting 2.5 per cent of the total high-potential rain-fed lands, at an estimated cost of US$ 7 billion. FAO also estimates that approximately US$ 14 billion will be required over the same period for investments in aquaculture development.

37. The total cost of technical assistance required over this period, both from national and external sources, has been estimated at US$ 1,640 million, covering feasibility studies, the establishment or strengthening of databases and monitoring systems, adaptive research and technology transfer, institutional strengthening and human resources development, fisheries and aquaculture, environmental protection, and policy and strategy formulation.

38. Recognition is now emerging that conventional economic analysis methods, as applied to agricultural projects that do not take into account the degradation of the natural resource base, do not provide a suitable measure of long-term sustainability. Case-studies conducted by the World Resources Institute in India, Chile, the Philippines and the United States led to the following general conclusions:

> "First, economic analysis that fails to measure changes in the productivity of natural resources will make farming practices that degrade the resources base look more valuable than those that conserve it. Second, when changes in the natural resource base are included in calculating farm income, resource-conserving production practices can compete economically and financially with conventional ones. And, finally, policies that encourage inappropriate natural resource use can cause significant economic and fiscal losses, as well as environmental ones." 19/

39. As stated in the report on these case-studies, "erosion and salinization can have enormous impacts on the productivity of agricultural soils. Depletion and contamination can damage groundwater resources. The pollutants in agricultural run-off can severely reduce the productivity of ecosystems and drastically shorten a reservoir's life". 19/ To the extent that no depreciation allowance is applied against current income for the loss of productivity, standard accounting practices provide an erroneous picture of the long-term economic and environmental sustainability of a given project.

II. TRENDS CONCERNING THE MANAGEMENT OF WATER RESOURCES

A. Africa

40. Although the Economic Commission for Africa has not recently conducted a survey of institutional responses to the recommendations of the Mar del Plata Action Plan and of Agenda 21, the view is expressed that in the light of serious political and economic problems, little if any significant success is evident in this regard, and that the fragmentation of institutional responsibilities hinders the formulation of holistic approaches for the integrated development of water resources.

41. In spite of this bleak assessment of the situation, there is evidence of an increasing recognition of the importance of implementing the recommendations contained in Chapter 18 of Agenda 21. The East African Water Resources Seminar held, with the support of the Government of Denmark, in Entebbe, Uganda, from 24 to 27 May 1993, agreed that the development and management of water resources in the East African region should be based on the general principles and guidelines emerging from the preparatory process of the United Nations Conference on Environment and Development held in Rio de Janeiro, Brazil, in June 1992. Those principles are spelled out in the report of the International Conference on Water and the Environment, 20/ held in Dublin in January 1992, and confirmed in Agenda 21, adopted by the United Nations Conference on Environment and Development.

42. The Seminar recommended that national water resources policies should follow general decentralization principles, and guidelines regulate the various roles, functions and decision-making processes at different levels; and that participation at all levels, especially that of the private sector, should be promoted. In addition, the participants also agreed that mechanisms for cross-sectoral coordination should be strengthened and developed and guidelines for cross-sectoral water resources impact assessments established.

43. The Seminar also recommended that practical guidelines for the estimation and application of direct, opportunity and environmental costs of water, and for charging, should be prepared, ensuring that charges reflected service levels and covered at least operation and maintenance costs, and were based on the full economic value of water, with allowance for cross-subsidization. A flexible legal framework for water resources management needs to be established and enacted at a national level, and enforced appropriately, and dynamic water action plans must be drawn up. The Seminar concluded that East African Governments needed to finance and maintain a well-coordinated information base in order to monitor and manage water resources at all levels, and that requirements for capacity-building needed to be assessed and appropriate plans formulated, with that involving institutions, local communities and users.

44. The Government of Uganda, with the cooperation of the Government of Denmark, is in the process of preparing a national water plan. Phase one of the project includes the carrying out of a rapid assessment of the water resources situation in the country, the preparation of a preliminary proposal for the establishment of an enabling environment for flexible water resources management, the formulation of a preliminary outline of a national water resources policy statement, and the formulation of detailed project proposals.

B. Asia and the Pacific

45. The last survey conducted by the Economic and Social Commission for Asia and the Pacific (ESCAP) concerning the implementation of the Mar del Plata Action Plan was completed in May 1991 and provided information from Afghanistan, Australia, Bangladesh, China, Guam, Hong Kong, the Pacific Islands (Palau), the Philippines, the Republic of Korea, Samoa, Singapore, Sri Lanka and Vanuatu. The survey indicated that considerable progress had been made by countries in the region towards the formulation of national water policies and comprehensive master plans.

46. Twelve of the countries in the area reported the existence of legislation covering basic ownership of and right to use, as well as protection of, surface water. The ownership of and right to use groundwater were regulated in 11 countries in the region. The majority of the respondents felt that their existing regulations were not sufficient or were incompatible with existing development plans. Although floods were a major concern to the majority of the countries in the region, most of them had no adequate structural or non-structural measures.

47. In October 1993, China's State Planning Commission, together with the State Science and Technology Commission, produced the document known as China's

Agenda 21. Freshwater resources are dealt with in chapter 14 of that document, which covers the protection and sustainable development of natural resources as programme E. The objectives are to formulate long-term plans of water supply and demand, and rationalize water resources based on assessment of water resources; to amplify necessary rules and regulations for the purpose of rationally developing and protecting water resources; to improve water quality and supply capacity, and control water pollution; to reform the water resources management system and to improve efficiency of water utilization; to control domestic and industrial water consumption so as to alleviate water shortages and pollution; to protect the aquatic ecosystem based on the interrelation of water, forest and land use; to forecast climate change impacts on water resources; and to formulate and pursue related policies for adoption.

48. Moreover, the objectives of other chapters in fields such as agriculture (80 per cent of China's water is used for irrigation), health and sanitation, human settlements, transportation and industry, energy (hydropower and process water for petroleum, coal mining), biodiversity (lakes, rivers and wetlands), control of soil erosion, desertification and flood prevention are dependent on successful water resources management.

49. Water Resources Management in North China, the project of UNDP and the Department for Development Support and Management Services of the United Nations Secretariat, anticipated the Agenda 21 proposals for integrated management. The project has already demonstrated a computer-based decision support system, which uses a suite of interactive programmes that model hydrology, water system operations and economic inputs/outputs. The process is controlled by a multi-objective analysis programme that provides information on the achievement of a set of goals related to gross domestic product (GDP), food security, employment and environmental conditions. The programme allows varying weights to be attached to the goals and the corresponding allocation of the water resources. It also takes into account differing sequences and timing of water resource development projects.

50. Being based on macroeconomics, it provides a tool for decisions on the investment programme for water resources management. Although started from the viewpoint of water resources, it is capable of going much further. With a change of supporting models and an expansion of the database, the process can handle other multisectoral economic resource inputs such as land and energy. It is still in process, even for water, and the basic models will need adaptation for other parts of China, as well as for other countries. There remains much to be done in programme development and in capacity-building, including the training of decision makers.

C. Latin America and the Caribbean

51. Water management in Latin America remains far from optimum despite the progress that has been made in the application of scientific management techniques. This is especially the case in regions where the use of the resource of water is most intensive and conflictive. In those regions the intensive use of water bodies has been difficult to accommodate within the existing management systems, as has the increasing urbanization of many river

basins. A recent study by the Economic Commission for Latin America and the Caribbean (ECLAC) shows that many issues inherent in water system operation are being poorly handled and even ignored. This is the case almost without exception with respect to the maintenance of infrastructure, but other aspects of system operation and management are being woefully disregarded as well. It is also observable that differences in management performance seem to be due not to organizational structure (although having an institutional structure in which water management issues can be publicly discussed helps), but to the degree of dynamism of management in any specific case. There is some evidence, however, that the establishment of a clear distinction between responsibility for the management of the resource and responsibility for the management of its use can be beneficial. Private sector or user participation in management can be a valuable tool in the effort towards achieving that distinction.

52. In the second half of the twentieth century, water management in Latin America has characteristically been highly centralized within the public sector and in the national Governments. The participation of other levels of government has been very limited, even in nominally federal States, and the idea of user participation has been honoured outside of the exceptions discussed above, only in the breach. The institutional structures prevalent in the countries of the region have varied markedly, but all have been centralist and with a very high degree of state control. One consequence has been the prevalence of national institutions with responsibility for a single water use. These institutions, which were founded mainly in the 1940s and 1950s, often replaced local water institutions that had been run municipally or regionally for centuries. The local institutions had, in many countries, a long history of user participation in their management. Such participation disappeared when management was centralized in national institutions.

53. The trend towards the management of water resources through centralized single-purpose institutions began to change in the 1970s. For example, in Argentina many responsibilities were transferred back to the provinces from the federal Government where constitutionally they had always rested. It came to a complete halt, however, with the crisis in Latin America that accompanied the debt crisis of the early 1980s. By then, the need to improve water management had become imperative, following Latin America's most serious economic recession since the 1930s; in most countries, the rate of expansion in the construction of control works slowed dramatically. There was growing concern that the gains anticipated from the investments that had been made in water control works had not been realized to the extent expected when the projects were originally undertaken. Moreover, there was criticism to the effect that in many water control projects heavy costs had been incurred in the loss of alternative environmental opportunities - costs not justified by the benefits actually obtained.

54. A result of the policies adopted to reduce the role of the state in Latin American societies has been the withdrawal of central Governments from water resource management responsibilities. The form of the withdrawal has varied considerably both among and within countries depending on their institutional structures and political traditions. One policy found in many countries has been that of the privatization of many water-related services, particularly hydroelectric power generation, as in Chile and Argentina, and water supply and

sanitation, as in Mexico, Argentina and Venezuela. Privatization has even been extended to irrigation as management of schemes has been transferred to users. Such transfers of management responsibility, which began in Chile in the late 1970s, are now basic policy in many countries, including Argentina, Colombia, Mexico and Peru.

55. Among all the countries of the region, it is in Brazil, Chile and Mexico that the most interesting innovations in water management policies have occurred in recent years - innovations that in themselves are very different, but that point to the possible future creation of water management systems applying such concepts as integrated and coordinated water resource management with a clear distinction between responsibility for the management of the resource and that for the management of its use. In all three countries, the policy initiative has come from the top down as part of the efforts to generally redefine the role of government. In Brazil, the proposal for the reorganization of water management is still only a proposal, although a reduction and reorganization of the federal structure are already in place. In Chile, a system of water administration has been created that distinguishes between public responsibility for the resource and the users' responsibility to manage its use. In Mexico, the National Water Commission (Comisión Nacional del Agua (CNA)), which has replaced the Hydraulic Resources secretariat (Secretaría de Recursos Hidráulicos), is charged with the institutional responsibility for integrated water management within a more decentralized administrative system.

1. Brazil

56. Even before the adoption of the new constitution in 1988, a series of reforms had been introduced into water management in Brazil. The most significant innovation was the experiment with joint federal, state and municipal river-basin boards to control water quality in the State of São Paulo. The success of this experiment led the federal Government to create the Special Committee for Integrated Water Management in 1978. The terms of reference of the Committee included the carrying out of coordinated studies and the fostering of integrated action by federal, state, local and private agencies. The Committee is constituted of the Special Secretariat for the Environment (SEMA), the federal electricity utility (ELECTROBRAS), the National Department of Sanitation (DNOS), the superintendencies for regional development and state secretariats.

57. Recently, successive governments have introduced significant changes in the structure of water administration in the federal government. Many agencies have been abolished and others amalgamated. A new Ministry of Infrastructure has been created that has responsibility for navigation and power generation and to which the National Department for Water and Electrical Energy has been transferred. Responsibility for some uses still rest, however, with other ministries, although the number of agencies has been considerably reduced.

58. The 1988 Constitution stipulates the creation of a new National Water Management System for the water resources falling under federal jurisdiction. There has been considerable discussion of the form that this system should take, but no decision has yet been made.

2. Chile

59. In Chile, the reform of the Código de Aguas: (the water law), the creation of the Head Office for Water (Dirección General de Aguas (DGA)), the replacement of the Dirección de Obras Sanitarias (the Sanitation Works Administration) by the Superintendencia de Servicios Sanitarios (the Superintendency for Sanitation Services), the creation of the Comisión Nacional de Riego (the National Irrigation Commission), and the promulgation of the Ley de Fomento de Riego (the Irrigation Improvement Law) have been among the most significant reforms. The result of these changes has been to change the thrust of the action of the state from one of almost complete responsibility for all aspects of water development and management to one of responsibility for the resource and of support and supervision of user actions. At the same time, most electricity utilities have been transferred to the private sector and the administration of water-supply and sewerage has been placed in the hands of regionalized autonomous companies; however, most shares in those companies are held by the Government.

60. The modifications made to the Código de Aguas have been the most commented innovations, and have included the creation of a market in water rights. The reformed water law, although maintaining water as a public good, establishes private ownership over the water right once it has been granted by the State. The right can be freely transferred on the open market. This, however, is only one among a number of interesting innovations. Among the most significant has been the establishment of one national body with comprehensive responsibilities for water resources data in the water directorate. From the water management viewpoint, equally significant are the reforms in the authority and responsibilities of the organizations of water users and in the role of public authorities in the management and construction of irrigation works.

61. The law assigns responsibility to the user organizations for the regulation and administration of water resources and related infrastructure under their respective jurisdictions. Most irrigation and drainage works, including dams and reservoirs, are now owned by user organizations.

62. River basins are not treated as water management units in Chile, but are commonly divided among two or more water committees. Any disputes among the committees must be resolved by the water directorate or by the courts.

3. Mexico

63. Mexico, although a federal State, has for a number of years enjoyed a highly centralized system of water administration. This system has recently undergone a profound revision which has changed the basis on which the administration operates.

64. The Comisión Nacional del Agua (CNA) was created in January 1989 to replace the Secretaría de Recursos Hidráulicos and to concentrate responsibility for water management in Mexico in one institution. CNA has responsibility to direct, coordinate and regulate all extractions from water bodies, all water use and all disposition of waste waters in Mexico. Despite the global responsibility of CNA, other government agencies have responsibilities in

respect of various aspects of water management. For example, the Secretaría de Reforma Agraria (the Agrarian Reform secretariat) intervenes in the regulation of the water rights of ejidos (common public lands) and other rural communities and the Secretaría de Marina (the Sea Affairs secretariat) has responsibility for uses affecting navigation.

65. Allowing for these and other exceptions, CNA is responsible for managing the supply of water and assigning the right to use water. CNA must determine the natural supply, the water balance and the annual availability of water. Water rights are granted for a period of not more than 50 years, and can be revoked if the use of the water is changed. The management of water use lies with a variety of institutions at the public, federal and state levels, and with the private sector.

D. Western Asia

66. In Yemen, with assistance from the Department for Development Support and Management Services of the United Nations Secretariat, reforms have been suggested that seek to integrate economic, technical, institutional and legal elements for the management of scarce water resources. The guiding principles for the reform have been the separation of regulatory functions from water use activities; comprehensive planning; integration with macroeconomic planning; and political feasibility. The proposed institutional structure comprises three components: a policy-making body; a regulatory independent agency; and a network of regional water engineers. The separation of the water management or regulatory function at the national level (policy development, supervision, and updating) and of the water development function at the sectoral and subsectoral levels (implementation of water projects aimed at the use of water for specific purposes) was warranted by the danger of neglecting the regulatory function due to preoccupation with lucrative development projects; conflict of interests arising from growing competition among water-using sectors; and the need for an independent entity to act on policy violations. Thus the responsibility for water management at the national level is not delegated to a water-using sector but to a central independent authority.

67. Similarly, Oman has established a Ministry of Water Resources in order to institute a comprehensive management of its water resources by a non-user institution.

E. General observations

68. The available information suggests a trend towards decentralization of authority and towards a separation of functions between organizations responsible for policy formulation, and those in charge of implementing projects and managing utilities. There has also been an increasing awareness of the importance of the role of women in the management, development and utilization of water resources. Unfortunately, however, data on the extent and impact of women's participation are lacking. The lack of information for planning and decision-making and an inadequacy of monitoring capabilities are still a pervasive problem in developing countries. This refers not only to the

assessment of surface waters and groundwaters, in terms of both quantity and quality, but also to water use and to the interrelationship involving land and water as well.

69. Early feedback from the follow-up to the International Conference on Water and the Environment and to the United Nations Conference on Environment and Development indicates that there is greater acceptance of the importance of a suitable enabling environment and of the concept of integrated water resources planning. Similarly, the concept of water as a scarce resource and as an economic good also seems to be gaining acceptance. However, an assessment of the extent to which the concepts espoused by the United Nations Conference on Environment and Development are being applied world wide would be premature at this juncture.

70. The private sector is playing an increasingly important role as a source of investment capital and in the operation and management of water resources utilities. This is the case not only in industrialized countries, such as the United Kingdom of Great Britain and Northern Ireland and France, but in many developing countries as well. The potential benefits of intervention by the private sector in developing countries are evident, in terms not only of the flow of financial resources, but also of the bringing of technical and managerial know-how and of the providing of financial and managerial autonomy to utilities. At the same time, however, a measure of regulation is needed in order to ensure that services are provided to the poorer strata of the population, that the policies of private utilities are in line with national objectives and that adequate attention is given to environmental concerns. An evaluation of the performance of the private sector in developing counties is not known to be available at this time.

71. With regard to pollution, the concept of trading permits is gaining in acceptance both in the United States of America and in the United Kingdom, in the case of both air and water pollution. Under this concept, polluters are able to trade pollution allowances within an overall limit. This approach may motivate companies to invest in more efficient pollution abatement technologies, enabling them to reduce discharges below the permissible limits and to sell the balance to other companies for a profit. Other companies may in turn find it more economical to purchase pollution allowances as the lowest-cost alternative to compliance with pollution standards. The conditions under which this concept could be applied to developing countries would need to be determined.

III. CONCLUSIONS

72. The information available as well as previous evaluations of progress in the implementation of the recommendations of the Mar del Plata Action Plan suggests that while there has been progress in several areas, very serious problems persist, and in some cases those problems are becoming alarming. While considerable progress has been made with regard to the eradication of some water-borne diseases, notably guinea worm, the outbreak of cholera in recent years illustrates the possible magnitude of an impending health crisis, particularly around urban concentrations. More and more rivers, recipient of untreated urban waste discharges, are becoming open sewers and pollution from

the indiscriminate use of agrochemical products is often rampant. Water resources of suitable quality are becoming scarce and increasingly expensive.

73. Recent international forums dealing with water resources issues have all brought about an increasing awareness of the global magnitude of a water crisis. This possibility was already brought to the attention of the world community at the time of the United Nations Water Conference in 1977, and renewed notes of alarm were sounded at the International Conference on Water and the Environment and at the United Nations Conference on Environment and Development. Although these expressions of concern may be deemed by many to be insufficient, there is a growing consensus among experts in the water resources field as to the seriousness of the situation. However, the spectre of a global water crisis has been overshadowed by concerns about other issues of manifest global proportions, such as the ozone layer, tropical forests and climate change. Internationally the seriousness of water problems has not as yet received the recognition warranted by the situation. Progress, however, is being made in this regard. On the other hand, at the national level, and particularly in developing countries, whatever measures have been taken, albeit in the right direction, have not been commensurate by and large, with the scope of the problems.

74. That this would be the situation in developing countries and economies in transition should not be surprising. For the last 15 years or so, most developing countries have had to cope with difficult economic conditions and been besieged by a slew of problems, all whether energy, food production, deforestation, urbanization, widespread unemployment and poverty or any one of many others - equally demanding top-priority consideration. Many of these developing countries are also in political turmoil, and their economies are in transition. Water resources cannot receive greater priority than other pressing problems unless a strong case is made to that effect.

75. Two elements are vitally important if a case is to be made to ensure that water resources receive a very high priority. First, an effective case cannot be made in the absence of solid information concerning the current situation and implications for the future. As has already been mentioned, information concerning the availability and quality of surface and water and groundwaters is often insufficient, and in many cases the capacity to collect data has been waning. The situation is even less satisfactory with regard to water resources uses, waste-water disposal, interrelationships between population, land and water, and impact of the application of economic and legal instruments to water resources use and pollution control. Second, owing to a lack of integration between water resources policy and planning and economic policy at the national and regional levels, whatever information might be available fails to find its due place in the national policy-making and planning process.

76. There is clearly a need for Governments to embark on a major effort to monitor key socio-economic, physical and environmental variables related to the assessment, development, utilization and management of water resources as an essential condition to progress. This needs to be done in a climate where, to date, insufficient attention and support have been given to this task. The collection of data for data's sake needs to be avoided at all costs, particularly under conditions of extreme financial stringency. As a matter of urgency, Governments need to develop and implement monitoring strategies for the

collection, analysis and dissemination of data of demonstrable value, including the formulation of methodologies for the evaluation of environmental variables.

77. The collection and analysis of information, as well as the formulation of policies and the implementation of holistic strategies, presuppose the existence of institutional structures that achieve a high degree of horizontal integration within the various sectors of water resources, including management structures at the lowest appropriate levels, and vertical integration with the national socio-economic planning process.

78. In terms of the international community, the level of financial support has consistently fallen short of requirements. To a great extent this can be attributed to the economic difficulties experienced by industrialized countries in recent years. Beyond this, however, there has been increasing scepticism regarding the long-term usefulness of project-oriented programmes, accompanied by requirements for greater involvement by the recipient Governments in the planning, management and financing of development ventures.

79. All the recommendations contained in chapter 18 of Agenda 21 deserve urgent attention. However, if significant long-term progress is to be achieved, it is suggested that priority attention be given to the establishment of "a dynamic, interactive, iterative and multisectoral approach to water resources management, including the identification and protection of potential sources of fresh water supply" 21/ as an essential precondition of the implementation of all other recommendations. To this effect, it is suggested that Governments consider the need to carry out a diagnostic assessment of the current situation vis-à-vis their current institutional arrangements and human resources capacity, with a view to formulating a strategy and an action plan for the years to come.

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REVIEW OF PROGRESS ON WATER-RELATED ISSUES: CONSIDERATION OF NEW INSTRUMENTS FOR GLOBAL ACTION

International instruments with implications for global action

Report of the Secretary-General

SUMMARY

The present report - which has been produced in response to Economic and Social Council decision 1993/302, in which the Council approved, as recommended by the Committee on Natural Resources, the provisional agenda and documentation for the second session of the Committee, as set out in the report of the Committee on its first session 1/ - was prepared, under the rubric of "Review of progress on water-related issues", on activities related to instruments for global action in other environmental areas and on the substantive content of such instruments (including an analysis of issues related to formalizing the rights of humanity and the relevant duties of Governments. The report describes the main elements of various international instruments that focus on water and environment, with emphasis on the principles deriving from the 1992 International Conference on Water and the Environment held in Dublin, and on Agenda 21 2/ as it relates to freshwater resources.

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I. PRELIMINARY OBSERVATIONS

1. The range of instruments that may be relevant for countries to consider in drafting international water-related legislation runs from formalized bilateral arrangements, to multilateral treaties, to actions by intergovernmental bodies and accredited non-governmental organizations. Today, there is an emerging consensus that all nations and peoples have a common responsibility to protect the Earth. Agenda 21, arising from the United Nations Conference on Environment and Development, held at Rio de Janeiro in June 1992, is currently the centre-piece of international cooperation and of the coordination of activities within the United Nations system, and will remain so for years to come. Agenda 21 spells out an action plan to implement the concept of sustainable development that can only be achieved by international cooperation. In order to meet the challenges of environment and development, States have decided to establish a new "global partnership" inspired by the need to achieve a more efficient and equitable world economy. That partnership commits all States to engage in a "continuous and constructive dialogue" to achieve a more efficient and equitable world economy - one built upon and reinforcing the concept of sustainable development.

2. Each item taken up in this report is deemed to have made a contribution to global matters of some importance with respect to the protection or improvement of environmental components associated with a more rational, integrated management of freshwater resources on a sustainable basis.

3. "Earth has been variously called the planet of water and the planet of life, the connection between the two attributes being by no means casual. Without water, there simply can be no life. Water flows in the veins and roots of all living organisms, as precious to them as the air they breathe and the food they eat. It is the lifeblood of their collective body." 3/ Precious freshwater resources cannot be protected and conserved solely by countries acting alone, however, because a major proportion of those resources are contained in international basins. Moreover, international measures related to the interactive role of water resources have considerable relevance to all matters involving environmental protection.

4. Beyond the legislation and regulations in a number of water-related fields that have been adopted by States during the last decade, 4/ there have been a number of highly relevant international agreements and collateral efforts demonstrating the increased awareness of water's pivotal position with respect to dealing with such matters as pollution, waste disposal, and product production. 5/

5. Equitable sharing of the environmental component of the international commons is of grave importance to the community and absolutely essential for the health of humanity. Many international instruments have been adopted that embody principles reflecting the fact that transboundary natural resources should be used in a reasonable and equitable manner. Although the notion of equitable sharing of the atmosphere is still embryonic because of existing environmental degradation and foreseeable threats of damage, development in this direction must be guided by the principles of equitable utilization and

participation. Such principles have been taken into consideration by recent environmental treaties such as the Montreal Protocol on Substances that Deplete the Ozone Layer (signed in 1987), and the Convention on Biological Diversity (1992) in which equitably shared burdens and common but differentiated responsibilities are placed on developed and developing countries.

6. Certainly from a global perspective progress in matters concerning water and the environment - fragmentary and often lacking adequate enforcement, monitoring and institutional efficacy - can be demonstrated.

II. INTERNATIONAL AGREEMENTS

A. Helsinki Convention of 1992

7. Under the auspices of the Economic Commission for Europe (ECE), the ECE countries convened in Helsinki, Finland, in March 1992 to conclude a salient and comprehensive treaty entitled the Convention on the Protection and Use of Transboundary Watercourses and International Lakes (E/ECE/1267). Twenty-four States, plus ECE, signed the Convention at that time. 6/

8. The Convention is aimed at strengthening "national and international measures to prevent, control and reduce the release of hazardous substances into the aquatic environment and to abate eutrophication and acidification, as well as pollution of the marine environment, in particular coastal areas, from land-based sources" (preamble). The Convention recalls (as antecedents), inter alia, the Declaration of the United Nations Conference on the Human Environment, 7/ held in 1972 in Stockholm, the Final Act of the Conference on Security and Cooperation in Europe, and the Regional Strategy for Environmental Protection and Rational Use of Natural Resource in ECE Member Countries Covering the Period up to the Year 2000 and Beyond. These and other exemplary instruments produced by the ECE's highly regarded Working Party on Water Problems not only provide sound guidance to the European group, but also constitute a paradigm worthy of careful study, if not emulation, by many countries around the world.

9. The topics treated include the entire gamut of water-related problems, such as flood management, drought management, 8/ water pollution control, cooperation in the field of transboundary waters, groundwater management, rational use of water in industrial processes, waste-water treatment, protection of soil and aquifers against non-point source pollution, an ecosystems approach to water management, institutional arrangements, monitoring and data for processing, warning and alarm systems and water for agriculture. 9/

10. The recent Helsinki Convention deals with transboundary impacts on transboundary waters, including "effects on human health and safety, flora, fauna, soil, air, water, climate, landscape and historical monuments or other physical structures or the interaction among these factors", and "on the cultural heritage or socio-economic conditions resulting from alterations to those factors" (article 1, para. 2). Generally, the "best available technology" is required for use in achieving convention objectives; "hazardous substances"

are defined as "substances that are toxic, carcinogenic, mutagenic, teratogenic or bio-accumulative, especially when they are persistent" (article 1, para. 6).

11. Waters are to be used in a "reasonable and equitable way" with the aim of ecologically sound and rational water management, to ensure conservation and restoration of ecosystems, where necessary. Measures taken must not result in a transfer of pollution to other parts of the environment; the cost of pollution prevention, control and reduction is to be borne by the polluter (articles 2 and 3).

12. Numerous additional provisions create duties and goals pertaining, inter alia, to environmental impact assessment, treatment of waste water, prevention of groundwater pollution, joint monitoring and water-quality objectives and criteria, warning and alarm systems, and settlement of disputes. However, the recent tendencies in some circles to promote consideration of an individual's legal right to adequate potable water-supplies, to freedom from hazardous substances in the environment, and to "public participation" in the decision-making process, or to establish water resources as part of the "global commons" are not taken up. 10/

B. Basel Convention of 1989

13. With the aim of drawing up a comprehensive treaty on the conveyance of hazardous waste across frontiers, a conference of plenipotentiaries in Basel, Switzerland, finalized the 1989 Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (UNEP/10.80/3, 22 March 1989). Such movements and final dispositions, which often incorporate water, must be effected in a manner consistent with the protection of the environment, and the conservation of natural resources, under conditions that do not endanger human health (preamble). The Basel Convention refers to the Cairo Guidelines and Principles for the Environmentally Sound Management of Hazardous Wastes (adopted by the Governing Council of UNEP in its decision 14/30 of 17 June 1987) and takes into account the Declaration of the United Nations Conference on the Human Environment (Stockholm, 1972). Hazardous wastes, whose movement is to be controlled and managed, are classified using three categories (annexes I, II and III).

14. Disposal operations are separated into those "which do not lead to the possibility of resource recovery, recycling, reclamation, direct re-use or alternative uses" (annex IV A) and those that may (annex IV B). The former category pays considerable attention to means involving land use, including injection of pumpable discards into wells, and impoundment of liquid or sludge discards in pits, ponds or lagoons, etc.; and release into a water body. Stringent regulation of disposal practices is prescribed for many of the permissible inter-State movements and disposals of hazardous wastes. Radioactive wastes, and wastes derived from normal ship operation, since they are controlled specifically by other international instruments, are excluded from the scope of the Basel Convention (article 1, paras. 3 and 4).

C. Convention on Environmental Impact Assessment, 1991

15. At Espoo, Finland, a major treaty, open to States that were members of, or in consultative status with, ECE, and to certain regional economic integration organizations, was signed in 1991. The treaty's full title was Convention on Environmental Impact Assessment in a Transboundary Context (E/ECE/1250); its purpose was "to ensure environmentally sound and sustainable development" and "to enhance international cooperation in assessing environmental impact in particular in a transboundary context" (preamble).

16. The Parties to the Espoo Convention are bound to take "all appropriate and effective measures to prevent, reduce and control significant adverse transboundary environmental impact from proposed activities" (article 2, para. 1). According to the Espoo Convention, to that end, the proposing Party shall "ensure that ... an environmental impact assessment is undertaken prior to a decision to authorize or undertake a proposed activity ... that is likely to cause a significant adverse transboundary impact" (article 2, para. 3). Appendix I of the Espoo Convention is a comprehensive list of such activities, involving, inter alia, crude oil refineries; coal gasification and liquification installations; thermal and nuclear power stations; nuclear fuel production, reprocessing and irradiated nuclear fuels; storage, disposal and processing of nuclear waste; cast-iron and steel smelting and production of non-ferrous metals; asbestos extraction, processing and transformation; integrated chemical installations; large-diameter oil and gas pipelines; inland waterways and major ports; waste disposal installations, including landfill of toxic and dangerous wastes; large dams and reservoirs; groundwater abstraction of 10 million or more cubic metres annually; pulp and paper manufacturing of 200 air-dried metric tons or more per day; major mining; major storage facilities for petroleum, petrochemical and chemical products; and large-area deforestation.

17. According to the Espoo Convention, originating Parties shall provide, "an opportunity to the public in the areas likely to be affected to participate in relevant environmental impact assessment procedures" (article 2, para. 6). The Espoo Convention's required environmental impact assessments shall, "as a minimum requirement, be undertaken at the project level of the proposed activity" (article 2, para. 7).

18. According to the Espoo Convention, "for a proposed activity listed in (its) appendix I that is likely to cause a significant adverse transboundary impact, the Party of origin shall ... notify any Party which it considers may be an affected Party, as early as possible" (article 3, para. 1). The notification shall contain any available information on the proposed activity's "possible transboundary impact; the nature of the possible decision; and an indication of a reasonable time" for responding (article 3, para. 2). Subsequent procedural steps to be followed are also set forth (article 3, paras. 3-8, and articles 4-6).

D. Ramsar Convention on Wetlands, 1971

19. The Convention on Wetlands of International Importance Especially as Waterfowl Habitat 11/ was signed in Ramsar, Iran, in 1971. In view of "the fundamental ecological functions of wetlands as regulators of water regimes and as habitats supporting a characteristic flora and fauna", and the need "to stem the progressive encroachment on and loss of wetlands", the Contracting Parties to the Convention express confidence with regard to protecting and restoring wetlands "by combining far-sighted national policies with coordinated international action" (preamble). This Convention has received broad recognition globally.

20. Article 1 of the Ramsar Convention defines wetlands as "areas of marsh, fen, peatland or water, ... with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres". Each Contracting Party agrees to "designate suitable wetlands within its territories for inclusion in a List of Wetlands of International Importance" to be maintained by the bureau established under article 8 (article 2). According to the Ramsar Convention the Parties "shall formulate and implement their planning so as to promote the conservation of the wetlands included in the List, and as far as possible the wise use of wetlands in their territory", reporting changes resulting from pollution or other human interference (article 3). Conservation measures set forth include establishing nature reserves on wetlands and providing adequately for their wardening (article 4).

21. The Parties pledge to "consult with each other about implementing obligations ... especially in the case of a wetland extending over the territories of more than one Contracting Party or where a water system is shared by Contracting Parties" (article 5). The Convention remains open for signature to "any member of the United Nations or of one of the Specialized Agencies or of the International Atomic Energy Agency or Party to the Statute of the International Court of Justice" (article 9). Thus, this Convention has the potential for extremely wide application, as awareness of the seriousness of wetlands preservation, reclamation and recovery develops.

E. Convention on Biological Diversity

22. The Convention on Biological Diversity, which arose out of the United Nations Conference on Environment and Development (Rio de Janeiro, June 1992), recognizes that international action and cooperation are urgent because of the immediacy of the threat that loss of biological diversity entails. This landmark Convention has been signed by all countries that were present at UNCED. The Convention was adopted after four years of deliberation by an Intergovernmental Negotiating Committee functioning under the United Nations Environment Programme (UNEP). The Convention aims to promote "conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of it the utilization of genetic resources" (article 1). It affirms that conservation of diversity is a common concern of mankind. At the same time, it reiterates that "States have sovereign rights over their own biological resources" (preamble). It adopts a holistic

approach to the problem by integrating the conservation and sustainable use of biological diversity into the relevant sectoral or cross-sectoral plans and policies. The special needs of developing countries are taken into consideration. The Convention concentrates on ensuring effective national action to curb the destruction of biological species, habitats and ecosystems, rather than on setting international norms.

23. Article 20 of the Convention on Biological Diversity contains the legal framework with respect to the providing of new and additional financial resources to enable developing countries to fulfil the obligations of this Convention.

III. SELECTED WATER-RELATED INTERNATIONAL INSTRUMENTS

24. In addition to the recent and important international instruments examined above, some of the other recent international actions specifically related to freshwater resources need to be covered briefly.

A. Dublin Statement and the Report of the International Conference on Water and the Environment

25. In January 1992, agencies of the United Nations system convened, in Dublin, the International Conference on Water and the Environment, which was preparatory to the United Nations Conference on Environment and Development (also known as the Earth Summit), held in Rio de Janeiro in June 1992. The Dublin Conference was clearly the most comprehensive global meeting on water resources since the United Nations Water Conference, held in 1977 at Mar del Plata, Argentina.

26. The principal objectives of the Conference, as set forth in the preface to the Dublin Statement and the Report of the Conference, 12/ included assessment of the current status of the world's freshwater resources and identification of priority issues for the 1990s; development of coordinated intersectoral approaches to managing those resources by strengthening the linkages between water programmes; formulation of environmentally sustainable strategies and action programmes for the 1990s and beyond; and promotion of increased awareness of the environmental consequences and development opportunities in improving the management of water resources.

27. Individual working groups focused on integrated water resources development and management; water resources assessment and impacts of climate change on water resources; protection of water quality and aquatic ecosystems; water and sustainable urban development and drinking-water supply and sanitation in the urban context; water for sustainable food production and rural development and drinking-water supply and sanitation in the rural context; and implementation and coordination mechanisms at global, national, regional and local levels.

28. It was agreed that concerted action was needed to reverse the current trends of overconsumption, pollution, and rising threats from drought and floods. Recommendations for action at all levels were grounded on four cardinal guiding principles: 13/ first, that fresh water was a finite and vulnerable

resource, essential to sustain life, development and the environment; second, that water development and management should be based on a participatory approach, involving users, planners and policy makers; third, that women played a central part in the provision, management and safeguarding of water; and fourth, that water had an economic value and should be recognized as an economic good.

29. It was acknowledged, within guiding principle No. 4, that it was "vital to recognize first the basic right of all human beings to have access to clean water and sanitation at an affordable price". Failure to recognize that rule in the past, including water's economic value, had resulted in wasteful and environmentally damaging uses of the resource, rather than in the achievement of efficient and equitable use, and encouragement of conservation and protection.

30. Recommendations for action were made under the following headings 14/ describing the principal benefits to be derived from implementation of the Dublin recommendations: alleviation of poverty and disease; protection against natural disasters; water conservation and reuse; sustainable urban development; more efficient agricultural production and rural water-supply; protection of aquatic ecosystems; resolution of water conflicts; provision of the enabling environment; augmentation and strengthening of the knowledge base; and building up of the requisite capacity.

31. A separate, well-thought-out section of the report of the Conference 15/ is dedicated to "integrated water resources development and management", organized around four principles. Since water sustains all life forms, a holistic approach is needed for the development of human societies and economies, and the protection of natural ecosystems, that includes not only the need to comprehend the entire hydrologic cycle involving interaction with the natural environment and land use, but also intersectoral needs. The holistic approach embraces an ecological approach, taking into account issues that stretch across the whole of a river basin or a groundwater aquifer, and giving consideration to the interrelation with other natural resources. According to the report of the Conference, where catchments cross national boundaries, international cooperation is essential (para. 2.2).

32. Given the importance of water to society, "everyone, particularly women and the underprivileged, should have a right of reasonable access at an affordable price" (para. 2.5). Other consequential subcategories are treated including information base and know-how; human resources development; public awareness; institutional and legal arrangements; demand management; law; finance; and investment (paras. 2.7-2.19).

33. Without detailed assessment, it is impossible properly to plan, design, construct, operate and maintain projects; to mitigate droughts and flood losses; to provide industrial and domestic-water supply, urban drainage, and energy production; to supply water for agriculture or fisheries; to undertake health measures or to preserve aquatic ecosystems and coastal waters (para. 3.2).

34. Little further examination of the report of the Dublin Conference can be made here, but section 4 of the report examines in greater detail than the Dublin Statement protection of water resources, water quality and aquatic

ecosystems. Section 5 of the report deals with water and sustainable urban development and drinking-water supply and sanitation in the urban context; section 6 deals with water for sustainable food production and rural development and drinking-water supply and sanitation in the rural context. Section 7 examines mechanisms for implementation and coordination at international, national and local levels, and section 8 presents options for follow-up.

B. Report of the United Nations Conference on Environment and Development: pertinent provisions of Agenda 21 (chapter 18)

35. The now-famous Agenda 21, 2/ the massive result of the United Nations Conference on Environment and Development, held in Rio de Janeiro in 1992, constitutes an all-inclusive treatment of the vast number of items affecting the planet's environmental plight, with attention to schemes for realizing socio-economic growth and development on a sustainable basis. Chapter 18 of Agenda 21 is devoted to "Protection of the quality and supply of freshwater resources: application of integrated approaches to the development, management and use of water resources". 16/

36. Virtually all environmental issues are directly or indirectly linked to freshwater issues. We have reached a stage where freshwater issues often become the limiting factor for sustainable development. Poor land-use management (for example, deforestation, non-sustainable agriculture, mining and urbanization) can lead to increased erosion, eutrophication and soil loss in river basins; sedimentation in large reservoirs may reduce the quantity of nutrients available downstream and to coastal waters. Acidification of surface waters and some groundwaters can lead to depletion of freshwater living resources, contributing thereby to the loss of biodiversity. Hydropower and irrigation dams, stream channelization, overabstraction from aquifers, and use of water bodies as open sewers can lead to salinization, saltwater intrusion into coastal aquifers, and serious water pollution problems.

37. Widespread scarcity, gradual destruction and aggravated pollution of freshwater resources in many world regions, along with the progressive encroachment of incompatible activities, demand, consequently, integrated water resources planning and management. Such integration must cover all types of interrelated freshwater bodies, including both surface water and groundwater, and duly consider water quantity and quality aspects. The multisectoral nature of water resources development in the context of socio-economic development must be recognized, as well as the multi-interest utilization of water resources for water supply and sanitation, agriculture, industry, urban development, hydropower generation, inland fisheries, transportation, recreation, lowlands and flat lands management and other activities. Rational water utilization schemes for the development of surface and underground water-supply sources and other potential sources have to be supported by concurrent water conservation and wastage minimization measures. Priority, however, must be accorded to flood prevention and control measures, as well as to sedimentation control, where required.

38. Water-related diseases are a major health problem, especially in developing countries. Diseases caused by microbiological pollution or transmitted by water-associated vectors, and those related to inadequate sanitation and the absence of clean water, are widespread. To ignore the linkages between freshwater issues and other sectoral issues could result in severe social, economic and human health consequences.

39. The Mar del Plata Action Plan, 17/ resulting from the United Nations Water Conference, held in 1977, plus the strategies for the 1990s resulting from Economic and Social Council resolution 1991/85, is still considered valid as the basis for national and international action programmes in the freshwater sector. Agenda 21 for this sector is based on those strategies, on the results of the Global Consultation on Safe Water and Sanitation for the 1990s, held in New Delhi in September 1990, on the recommendations of the International Conference on Water and the Environment (Dublin, 1992), and on the work of the Preparatory Committee for the United Nations Conference on Environment and Development.

40. From the general objectives, the following programme areas became the individual sections composing the main body of chapter 18 of Agenda 21:

(a) Integrated water resources development and management;

(b) Water resources assessment;

(c) Protection of water resources, water quality and aquatic ecosystems;

(d) Drinking-water supply and sanitation;

(e) Water and sustainable urban development;

(f) Water for sustainable food production and rural development;

(g) Impacts of climate change on water resources.

41. Integrated water resources development and management involves many elements, requiring, inter alia, the transfer, adaptation and diffusion of new techniques and technology among developing countries, as well as the development of endogenous capacity, for the purpose of being able to deal with the added dimension of integrating engineering, economic, environmental and social aspects, and predicting the effects in terms of human impact.

42. While the ramifications and importance of each of the many factors put forward in chapter 18 of Agenda 21 are familiar to many engaged in the water resources sector, Agenda 21 speaks also to persons immersed to a lesser degree in the concerns of modern water resources management, including those specialized in other sectors and political leaders. The impact of this exhaustive output from the United Nations Conference on Environment and Development will be the focus of intensive dissection for several years at least, although the capacity of the international community and of individual countries (especially developing countries) to execute many of the tasks called for may be limited.

C. Other programmes and actions

1. International Drinking Water Supply and Sanitation Decade

43. The General Assembly, in its resolution 35/18 of 10 November 1980, proclaimed the period 1981-1990 as the International Drinking Water Supply and Sanitation Decade. In its resolution 45/181 of 21 December 1990, the Assembly expressed deep concern that the current rate of progress remained slow and would leave a very significant number of poor people in urban and rural areas without suitable and sustainable services in water and sanitation by the year 2000, and recognizes that the 1990s would require an intensification of national efforts and international cooperation. The New Delhi Statement (A/C.2/45/3), resulting from a United Nations Development Programme-organized Global Consultation on Safe Water and Sanitation for the 1990s, advanced, inter alia, the necessity of protecting the environment and health and the need for institutional reforms (including the full participation of women), keeping in view the requirements and continuing shortfall in the fields of water supply and sanitation. Coordination of activities should be intensified, particularly through the inter-agency Administrative Committee on Coordination (ACC) Subcommittee on Water Resources and the new Water Supply and Sanitation Collaborative Council, as mentioned in Assembly resolution 45/181.

2. Delft Declaration, 1991

44. A UNDP-sponsored symposium, held in Delft, the Netherlands, in 1991, produced A Strategy for Water Resources Capacity-Building in the next century called the Delft Declaration. 18/ "Between 1950 and 2000," the Declaration begins, "the world population will have more than doubled". It continues: "Of 22 metropolises of more than 10 million people, 18 will be in the developing countries of Asia, Africa and Latin America. By 2025, 60 per cent of the world population, more than 5 billion people, will be living in cities. Water directly affects their public health and economic development opportunities. In addition, large proportions of the rural population are likely to remain unserved" (para. 1).

45. The Delft Declaration emphasizes the challenge of satisfying those needs, while noting the increasing need for irrigated agriculture, and the consequences of urban and industrial pollution. It states that "measures have to be taken to protect and conserve the water as major resource and unifying element of our environment" (para. 2). Institutional weaknesses and malfunctions are pointed up as major causes of ineffective and unsustainable water services, requiring urgent attention to building institutional capacity and making it more demand-responsive. The challenge is to upgrade the development of policies, rules, organizations and management skills so as "to better manage water resources coherently", which calls for "an expansion of national, integrated planning" (para. 3).

46. Capacity-building is increasingly recognized as an important, long-term, continuing process in achieving sustainable development. Community organizations and water-user associations need to be supported and given productive participation; the pivotal role of women in water-related activities,

and their proved capabilities to carry out managerial assignments, call for continued attention.

47. It was recommended in the Delft Declaration that the Declaration be transmitted to the 1992 International Conference on Water and the Environment (Dublin), and subsequently to the United Nations Conference on Environment and Development "to emphasize the special importance of capacity-building in integrated fresh-water resources management". The Delft Symposium's useful conclusions and recommendations are articulated in an annex to the Delft Declaration entitled "Helping countries to solve their problems themselves".

48. "The main objective of capacity-building is to improve the quality of decision-making, sector efficiency and managerial performance in the planning and implementation of water sector programmes and projects" (annex to the Delft Declaration, para. 6). In that context, "due attention must be given to the legal and institutional arrangements needed to address the development, use and protection of internationally shared water resources" (annex to the Delft Declaration, para. 14).

3. Regional developments

49. The 1993 list of Bilateral and Multilateral Agreements and Other Arrangements in Europe and North America on the Protection and Use of Transboundary Waters (ECE/ENVWA/32) shows that more than just a few international watercourses are still not covered by agreements or arrangements, particularly watercourses bordering or transiting the newly created States of Eastern Europe and Western Asia. On the other hand, the Russian Federation and Kazakhstan entered into an agreement (27 August 1992, at Orenburg, Russian Federation) on the joint use and protection of shared water resources against pollution. A similar agreement between Ukraine and the Russian Federation was concluded in October 1992.

50. The 1990 Action Plans for the Rivers Saar and Moselle require that their commissions work together closely. Contemplated under the Action Plans is, inter alia, a 50 per cent reduction of industrial, urban and diffuse discharges of 14 priority pollutants between 1985 and 1995. The Saar and Moselle commissions are responsible for the phased implementation of the reduction measures, the assessment of discharges, the definition of concrete actions to be taken, and the preparation of further action required to achieve compliance with the agreement's objectives by the year 2000. Under an agreement in 1990 between the former Czechoslovakia, Germany and the European Community, an International Commission for the Protection of the Elbe River was created to attain the objectives of the 1991 Programme Concerning the Reduction of the Noxious and Hazardous Substances Load of the River Elbe and its Catchment Area. Guaranteed drinking-water production and ecosystems improvement in the catchment area are planned for the purpose of attaining (as closely as possible) the natural state of the system. In addition, several new agreements are in preparation between two or more Eastern European States, and some earlier existing agreements are under revision. Water-quality monitoring, plus water-level and flow rate measurements, is now covered in many of the European agreements, best exemplified by the monitoring programmes of the Rhine and Elbe commissions,

which now cover hydrobiological or microbiological data, as well as data on quantity and quality of suspended and bottom sediment, in addition to the traditional water flow and instream-quality data. 19/

4. Other relevant principles

51. According to the principle of prior consultation, a State ought to consult another State when it is contemplating an action that may adversely affect that other State, even though such action would not be in violation of prevailing international law. The legal concept of prior consultation, well entrenched in international law, has been invoked by States facing environmental problems, especially those having transboundary aspects. It is important because it can operate proactively before an environmental problem occurs, rather than merely reactively after the problem has become a reality. The practice reflects the legal principle that an abuse of right is contrary to law, and the principle that the bearer of property rights must not cause significant harm to other parties (sic utere tuo, ut alienum non laedas).

52. The precautionary principle has emerged within the last few years as a new policy instrument requiring that substances or activities that may be detrimental to the environment could be regulated even without conclusive evidence of harmfulness. Before the effects of the damaging activities become irreversible, regulatory action should be taken. The "preventive" approach has been recognized in a number of recent declarations, including the Montreal Protocol amendment (1990) and the Convention on Biological Diversity. Fully implemented, the precautionary principle would require potentially polluting substances to be regulated before they could adversely affect the environment.

IV. INTERNATIONAL WATERCOURSES AND THE INTERNATIONAL LAW COMMISSION

53. The International Law Commission (ILC) has produced an "instrument" of potentially overarching importance, namely, the draft articles on the law of the non-navigational uses of international watercourses, adopted on first reading by the Commission in 1991. 20/ That tentative adoption came after 17 years of rigorous examination of, and polite debate on, each aspect of the topic. The several Special Rapporteurs appointed by the Commission over the years delved deeply into the historical development of international water resources law and, over time, proposed groups of articles supported by extensive commentary, taking into consideration the observations made in the Legal Committee (Sixth Committee of the General Assembly) each year. After the forty-third session of the Commission (1991) a new Special Rapporteur was named to shepherd the draft articles through to the second reading, after which the General Assembly will decide the disposition of the articles.

54. The draft articles begin by treating matters of scope and definition, of course, followed by the terms concerning watercourse agreements (part I, Introduction). Part II comprises general principles, and is followed by part III on planned measures, part IV on protection and preservation, and part V on harmful conditions and emergency situations. The articles conclude with

part VI (miscellaneous provisions). Only a few of the articles have, thus far, come under sharp criticism in the Legal Committee of the General Assembly and from the academic community. 21/ Nevertheless, there are disagreements still, for example with respect to the relationship between "equitable utilization and participation" on the one hand and "appreciable harm" on the other, in one particular case (articles 5 and 7). Another disagreement concerns the omission of provisions on the actual behaviour of "confined aquifers" (or confined groundwater) in the draft, and still another on the appropriateness of inserting at the last minute the requirement of "flowing into a common terminus".

55. In the absence of specific agreement between States sharing an international watercourse (watercourse States), it is intended that the residual rules of international law governing any conflict or dispute would be found in the ILC articles, though agreement between or among the contending Parties is always to be preferred. Special dispute avoidance and settlement articles that had been part of earlier Special Rapporteurs' proposals were forced out by the Commission.

56. That the International Law Commission was able to arrive at an agreed first reading set of principles and rules is remarkable in itself, and they will be quoted and used indefinitely (assuming second-reading approval and some form of endorsement by the General Assembly). The articles may even replace the extensive and influential earlier work by l'Institut de droit international (Institute of International Law) (for example, the 1979 Athens Resolution on the Pollution of Rivers and Lakes and International Law) and the International Law Association (for example, the famous Helsinki Rules on the Uses of the Waters of International Rivers, and the Seoul Rules on international groundwaters), among other non-governmental organizations that have made contributions to the subject.

V. CONCLUSIONS

57. There has thus been considerable forward movement concerning freshwater resources management, in the elaboration and expansion of the scope of international instruments designed to cope with the vicissitudes and the optimum utilization and protection of that precious resource: water. 22/ Consciousness indeed has been elevated, although water resources must continue to compete for human and financial resources with all the other sectors in the society and economy of every State.

58. Several significant trends are evident. Recognition of the necessity for the development, exchange and dissemination of relevant data and information, in particular in a transboundary context, has become widespread. The institution of broad-based procedures and consultations for environmental impact assessments with respect to proposed projects that may result in significant adverse impacts is appearing in most recent international agreements, as well as in technical meeting recommendations and declarations. The issue of the transport and disposal of wastes that are hazardous to human health or to the environment in general has gained global attention. Also, notification and warning obligations are becoming institutionalized.

Notes

1/ Official Records of the Economic and Social Council, 1993, Supplement No. 8 (E/1993/28), chap. I, sect. Q.

2/ Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, vol. I, Resolutions Adopted by the Conference (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex II.

3/ Donald Worster, Rivers of Empire: Water, Aridity, and the Growth of the American West (New York, Pantheon, 1985), p. 19.

4/ On current national strategies and policies for the protection and use of transboundary waters for selected countries, see ECE document ENVWA/WP.3/R.30, 23 September 1993.

5/ For a review of earlier progress, see, inter alia, Experiences in the Development and Management of International River and Lake Basins, Proceedings of the United Nations Interregional Meeting of International River Organizations, Dakar, Senegal, 5-14 May 1981, Natural Resources/Water Series, No. 10 (United Nations publication, Sales No. E.82.II.A.17); and River and Lake Basin Development, Proceedings of the United Nations Interregional Meeting on River and Lake Basin Development with Emphasis on the Africa Region, Addis Ababa, Ethiopia, 10-15 October 1988, Natural Resources Water Series, No. 20 (United Nations publication, Sales No. E.90.II.A.10). See also Management of International Water Resources: Institutional and Legal Aspects. Report of the Panel of Experts on the Legal and Institutional Aspects of International Water Resources Development, Natural Resources/Water Series, No. 1 (United Nations publication, Sales No. E.75.II.A.2); Legal and Institutional Factors Affecting the Implementation of the International Drinking Water Supply and Sanitation Decade, Natural Resources/Water Series, No. 23 (United Nations publication, Sales No. E.88.II.A.21); and Institutional Issues in the Management of International River Basins: Financial and Contractual Considerations, Natural Resources/Water Series, No. 17 (United Nations publication, Sales No. E.87.II.A.16).

6/ The Convention is open to the States members of ECE as well as to States in consultative status with ECE, and also to regional economic organizations constituted of States members of ECE that have transferred competence over matters governed by the Convention to ECE (including competence to enter into such treaties).

7/ Document A/CONF.48/14/Rev.1, part one, chap. I.

8/ See also the document entitled "Flood and drought management in the ECE region" (ECE/WATER/35), 26 June 1984.

9/ See, for example, document ECE/WATER/47, 2 March 1987.

10/ But see S. McCaffery, "A human right to water: domestic and international implications", Georgetown International Law Review, vol. 5, No. 2 (fall 1992), and works cited therein; General Assembly resolution 37/137 of 17 December 1982 on protection against products harmful to health and the environment; H. Nito, "The evolutionary process of the principle of the right to a healthy environment and its background", in Biotechnologie, Ethik und Recht in wissenschaftlicher Zeitalter, Beiheft 39, T. Campbell and others, eds. (Stuttgart, 1991), pp. 39-43; J. Caillaux, "Human rights and international environmental disputes ...", Per un tribunale internazionale dell'ambiente (Milan, 1990), pp. 651-661; M. Bedjaoui, "The right to development", in International Law: Achievements and Prospects, M. Bedjaoui, ed. (Paris, UNESCO, 1991), pp. 1,177-1,203; G. Alfredsson and A. Ovsiouk, "Human rights and the environment", Nordic Journal of International Law, vol. 60 (1991), pp. 19-27; and J. I. Glazewski, "The environment, human rights and a new South African Constitution", South African Journal on Human Rights, vol. 7 (1991), pp. 167-184.

11/ United Nations, Treaty Series, vol. 996, No. 14583, p. 245.

12/ International Conference on Water and the Environment: Development Issues for the 21st Century, 26-31 January 1992, Dublin, Ireland. The Dublin Statement and the Report of the Conference (Geneva, World Meteorological Organization, 1992).

13/ Ibid., the Dublin Statement, guiding principles.

14/ Ibid., the action agenda.

15/ Ibid., Report of the Conference, sect. 2.

16/ See document E/C.7/1993/5, 15 February 1993, for a summary of the chapter's provisions.

17/ Report of the United Nations Water Conference, Mar del Plata, 14-25 March 1977 (United Nations publication, Sales No. E.77.II.A.12), chap. I.

18/ See A Strategy for Water Sector Capacity Building, Proceedings of the UNDP Symposium, Delft, 3-5 June 1991, International Institute for Hydraulic and Environmental Engineering (IHE) Report Series, No. 24, G. J. Alaerts, T. L. Blair and F. J. A. Hartvelt, eds. (Delft, the Netherlands, and New York, IHE and UNDP, 1991), part one.

19/ See ECE document ENVWA/WP.3/R.38, 29 September 1993. See also World Bank, Water Resources Management: A World Bank Policy Paper (Washington, D.C., International Bank for Reconstruction and Development/World Bank, 1993); and compare, Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (1986), and Australian Intergovernmental Agreement on the Environment (between the Commonwealth, the States, the Capital Territory, the Northern Territory and the Local Government Association) (1992).

20/ See Official Records of the General Assembly, Forty-sixth Session, Supplement No. 10 (A/46/10), chap. III.

21/ The one thoroughly scholarly and detailed review thus far, entitled "The non-navigational uses of international watercourses", for which experts of international standing on the topic were brought together, is to be found in the Colorado Journal of International Environmental Law and Policy, vol. 3, No. 1 (special issue).

22/ A recent and remarkable manifestation of the growing, yet still imperfect acceptance of modern principles and rules applicable to international freshwater resources is to be found in River and Lake Basin Development, Proceedings of the United Nations Interregional Meeting on River and Lake Basin Development with Emphasis on the Africa Region, Addis Ababa, Ethiopia, 10-15 October 1988, Natural Resources Water Series, No. 20 (United Nations publication, Sales No. E.90.II.A.10), especially chap. I, sect. 3 (B), on recommendations with regard to legal and institutional aspects.

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LECISLATIVE AND INSTITUTIONAL ASPECTS OF WATER-RESOURCES MANAGEMENT

Institutional and legal issues in integrated water-resources management

Report of the Secretary-General

SUMMARY

The present report has been prepared in response to Economic and Social Council decision 1993/302 and the recommendation of the Committee on Natural Resources at its first session. The report addresses the increasing link between water legislation and economic and environmental issues, focusing mainly on water quality and pollution control. There is a growing awareness of the need for integrated and efficient water-resources planning, particularly river-basin and regional planning, as well as the need for greater coordination with planning for other natural resources, while taking economic and social objectives into account.

There is also a greater interest in developing appropriate information and guidance for policy makers, administrators, users, purveyors of water services and the general public. There have been important developments in conflict-solving as well as in prevention arrangements and procedures. There is a growing trend to involve the private sector and local governments in the provision of water-related services, the purveyors of which are closely monitored.

* E/C.7/1994/1.

There is, moreover, a concern to improve water allocation, for which water marketing is seen as an important mechanism. However, some authorities have indicated that marketing must be regulated to prevent undesirable environmental and social effects. The impact of subsidies on efficient allocation and sustainable water use is under increasing scrutiny. In many countries, the economic, environmental and social effects of water-related programmes, policies and projects are assessed before decisions are made. There is also a distinct trend to differentiate the institutional structures that deal with the planning, allocation and control of water resources from discrete operational activities and economic sectors. Water legislation and water management are affected by the need to improve the economic efficiency of water allocation and use in environmental and social settings in which market failures and external influences are common. Thus, economic flexibility may require greater accommodation with the environmental requirements and social concerns posed by sustainable development.

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INTRODUCTION

1. The present report on water legislation and institutional arrangements is submitted in compliance with Economic and Social Council decision 1993/302. The report identifies developments in water legislation in a number of countries. The institutional infrastructure for water management includes water policies; legal principles; organizational arrangements; and economic factors, elements and situations resulting from policy decisions and legal arrangements.

2. Although the report covers a wide range of issues, it does not purport to be exhaustive. There are important subjects that have not been dealt with due to limitations of time and space, including stakeholder and user participation, and the internal organization and minimum institutional requirements of organizations that deal with water planning and water-related services. The Committee may wish to request that a full report on those or other subjects be submitted to it at its next session.

3. Modern water legislation has considerably broadened the type and scope of issues to be considered in the regulation of water resources, in the following ways:

(a) There is a clear tendency to link water legislation to economic and environmental issues, with a strong emphasis on quality and pollution control;

(b) Special consideration is given to the international implications of domestic water legislation. Reference to international issues has been made in several water laws;

(c) Enforcement provisions have acquired greater relevance and some laws have addressed them in detail;

(d) There is a concern with integrated and efficient water-resources planning, particularly river-basin and regional planning. Water planning is coordinated with planning for other natural resources as well as with economic and social objectives. Planning includes water quality and quantity;

(e) Technology and research are specifically required by several laws;

(f) There is more concern to develop appropriate information and guidance for policy makers, administrators, users, purveyors of water services and the general public;

(g) Public participation is required in several legal arrangements.

4. There have been important developments in conflict resolution, prevention arrangements and procedures. In the past, conflicts were generally resolved by means of adversarial procedures. At present, legislation is also aiming to resolve conflicts by means of consultation, mediation, coordination, cooperation and inter-jurisdictional arrangements.

5. There is a definite trend to involve the private sector and local governments in the provision of water-related services. The purveyors of those services are closely monitored for, inter alia, the quality of their services, the environmental impact of their activities and their financial and economic status. Corporations providing water-related services are becoming global.

6. There is a concern to improve water allocation, for which water marketing is an important mechanism. However, some authorities have indicated that marketing must be regulated to prevent unwanted environmental and social effects. It has also been noticed that the performance of water markets depends on their particular location. The impact of subsidies on efficient allocation and sustainable use is under increasing scrutiny.

7. In many countries, the economic, environmental and social effects of water-related programmes, policies, and projects are assessed before decisions are made. The use, protection and planning of water resources is increasingly regulated by general environmental legislation.

8. There is a definite trend to differentiate the institutional structures that deal with the planning, allocation and control of water resources from discrete operational activities and economic sectors. However, sectoral needs in water planning and allocation must also be considered.

9. Water legislation and water management are affected by the need to improve the economic efficiency of water allocation and use in environmental and social settings in which market failures and external influences are common. This is best exemplified by two current trends in water management: the development of water markets, and an increased emphasis on water planning and regulation of externalities, both of which are needed. Thus, economic flexibility may require accommodation with the environmental requirements and social concerns posed by sustainable development.

I. WATER LEGISLATION

A. Water policies

10. Several countries state the purposes and objectives of their water policies in their water legislation. Such statements are relevant to the interpretation, application and enforcement of legislation.

11. Canada, in its Water Act of 1970, encouraged the optimal use of water resources for the benefit of all Canadians (art. 1). The federal Government can enter into agreements with the provinces with a view to preparing comprehensive water-resources management programmes (art. 4).

12. Germany, in its Water Law as amended on 23 September 1986, requested that water (both surface and groundwater) be managed in a manner that served the common interest, benefiting individual users while preventing avoidable harmful impacts (art. 1a).

13. The Netherlands, in its policy document on water management, 1/ established a policy of integrated water-resources management that included both the quantitative and the qualitative aspects of water management.

14. China, in its Water Law of 1988, aimed to ensure the rational development, utilization and protection of water resources, fully realizing the benefits of water for economic development and the livelihood of the population. Water is under public ownership, water rights are protected and the development and utilization of water resources is encouraged in the same manner as the control of water disasters (arts. 1-4).

B. Conditions of water use

15. There is a general trend to control the use of water by legislating such formal requirements as obtaining a permit and such substantive requirements as effective and beneficial use, no harm to third parties, environmental protection and efficiency).

16. Germany, in its Water Law as amended on 23 September 1986, attached a number of conditions to water use, permits and licences, including effective use, prevention of detrimental effects, payment of compensations, preventive assessment, appointment of caretakers, remedial measures and payment of common control costs (art. 4). A particular feature of the German legislation is the possibility of imposing new conditions even after a permit or license has been granted. Ex post facto conditions may apply to either the environmental or the economic requirements of water-resources management (art. 5). A water right can be revoked for non-use, lack of need, change of use by the permittee, use beyond the allocation under the permit etc. (art. 15). Permits are required for both withdrawing water and effecting discharges into it. However, as to the relationship between the Administration and a water user, a water right is not an entitlement to any specific water quantity or quality (art. 2). Applications can be rejected and permits and licences are granted for specific purposes, in a specific manner and to a specific extent, and are revocable (arts. 6 and 7). Use of water by property owners and riparians shall not adversely affect other persons, cause detrimental change to water, adversely alter water balance or substantially reduce water flows (art. 24).

17. China, in its Water Law of 1988, required that water uses, with certain exceptions, be subject to permit (art. 32); that the ratio of reuse be increased (art. 7); and that water uses not infringe upon public and third-party interests and rights, bearing in mind the requirements of flood control. Water development must consider the interests of different regions and of both upstream and downstream users. Domestic water demands are given priority. There is an express policy to encourage hydropower. Agricultural and industrial uses are also to be considered (arts. 12 to 16). Water supplied by projects and water withdrawals are subject to charges and fees (art. 34).

18. The United Kingdom of Great Britain and Northern Ireland, in its Water Resources Act of 1991, required a licence to abstract and impound water (sects. 24 and 25). Such licences must respect existing rights and privileges, and are subject to conditions and changes, including emergency variations and

revocation for non-payment of charges (sects. 57 and 58). In addition, the National Water Authority is empowered to design schemes for imposing water-resources and pollution-control charges; levies for flood defence; general and special drainage charges; fisheries charges or contributions; and navigation tolls (sects. 123, 131 to 144). In its Water Act of 1989, the country authorizes emergency measures at times of drought. Those measures include subjecting water uses to conditions and restrictions, prohibiting or limiting water takings, and suspending or varying authorizations (sects. 131 to 135). Other emergency measures concern information related to pollution incidents (sect. 119). The collection of charges for water applications and water licences is also provided for (sect. 129).

19. There are some systems in which water rights are not subjected to conditions of effective and beneficial use or there is no forfeiture of water rights for non-use. However, those systems contain a major requirement not to affect the rights of third parties. 2/

20. Conditions imposed on water use also act as mechanisms for demand management and water allocation. Thus, certain environmental requirements, such as minimum flows, are considered beneficial uses in a number of systems. The system of priorities guides the allocation of water and also the direction of funding for development. The pricing of water is a tool for both allocation and increased efficiency.

C. Quality controls and environmental concerns

21. As water becomes scarcer relative to demand, as externalities increase and as knowledge improves, the need to control the deterioration of water quality is translated into more detailed and demanding legislation. Permits, prohibitions and charges are used to curb the deterioration of water and related natural resources and environmental assets.

22. Canada, in its Water Act of 1970, limited the quantities of and the conditions under which waste could be disposed of in water-quality management areas. These conditions include the payment of fees (art. 8). There are provisions that allowed the prohibition and regulation of nutrients and will eventually allow the seizure of cleaning agents or conditioners that are manufactured in, or imported into Canada in violation of the law (sects. 18 to 20). The Act also provides for the designation of water-quality management areas and the implementation of water-quality management programmes (art. 11). Water-quality management agencies are responsible for planning, initiating and carrying out programmes to restore, preserve and enhance the quality of the water within their water-quality management areas (art. 13).

23. Germany, in its Water Law as amended on 23 September 1986, imposed a general duty to prevent water contamination and any detrimental changes of its properties, requiring an economical use of water in the interests of conserving natural water resources (art. 1a). Discharges into water are subject to maximum loads and technological requirements. Hazardous wastes must be treated using the best available technology (art. 7). The Länder are responsible for specifying the public corporations responsible for waste-water disposal, the

prerequisites of waste disposal and the plans according to which waste water will be managed, treated and disposed of (art. 18). The Länder may also establish lists of prohibited substances, effects to be prevented and minimum requirements to be fulfilled by disposal systems. There is provision for strict, joint and several liability resulting from damages caused by introducing or throwing any substances into water (art. 22). Discharges causing insignificant detrimental changes are to be allowed only when overriding public interest requires it. Water can be subject to characterization parameters issued by the federal Government (art. 36b). The law also provides for proper flow conditions, maintenance of navigation, ecological requirements, landscape features, protection of banks and self-purification (art. 27).

24. Germany, in its Act on Waste-Water Charges of 6 November 1990, provided for water charges to be paid for water pollution. Charges are based on noxiousness levels, which depend on oxidizable substances, phosphorous, nitrogen, mercury, cadmium, chromium, nickel, lead, copper and their compounds; and on toxicity to fish (arts. 1 to 3). They are also based on the classification of particular river basins and the number of units of noxiousness in the water body downstream of the river classification basin. Water charges are to be paid by anyone discharging waste water. The revenue resulting from water charges shall be used to finance measures to improve water quality (arts. 9 and 13).

25. The Netherlands, in its policies on environment and water, aimed primarily at ensuring and maintaining a safe and habitable country and developing and maintaining healthy water systems that guaranteed sustained use. 3/ Three so-called screens have been established: (a) reduction of pollution at the source; (b) hydraulic design; and (c) rational or guided use of water resources, in particular groundwater. Quality objectives and monitoring methods and procedures have been established. The system includes the licensing of discharges into water and, for specific industrial sectors, into sewers; the payment of pollution charges; and the preparation, every five years, of action plans to combat water pollution. 4/ The policies also address diffuse pollution, such as that caused by atmospheric deposition, tars utilized as protection materials for wooden shore and bank facilities, and agricultural run-off and leachates. Some pesticides have been absolutely prohibited, others are restricted and some are subject to application according to best environmental practices. Additional measures, intended to control environmentally negative effects, include friendly environmental design as well as sedimentation and eutrophication control. The costs of pollution control and environmental protection in the Netherlands are met either through the general budget financed by taxpayers or through a special budget financed with levies or charges raised from polluters.

26. The United Kingdom of Great Britain and Northern Ireland, in its Water Act of 1989, provided for the classification of water quality (sect. 104); the establishment of water-quality objectives (sect. 105); the control and remedy of pollution (sect. 107); protection from sedimentation and refuse or waste vegetation (sect. 109); protection against pollution (sect. 110); the creation of water-protection zones (sect. 111); the establishment of nitrate-sensitive areas (sect. 112); the establishment of minimum acceptable river flows (sect. 127); and the enactment of codes of good agricultural practices, with a view to protecting water resources (sect. 116). In its Water Resources Act of

1991, the United Kingdom imposed conservation and enhancement duties on its ministers and on the National Rivers Authority with a view to protecting amenities, flora, fauna, historical places and other environmental interests. Public access and public availability are also taken into account. Those duties are also to be considered when dealing with undertakers and their proposals for the management of waters and lands (sect. 16). Additional duties relate to environmental concerns for sites of special interest and for the enactment of codes of practice with respect to environmental and recreational duties (sects. 17 and 18).

27. China, in its Water Law of 1988, created a state duty to protect water resources and adopt effective measures for the protection of flora, conserve water sources, control soil and water losses and improve the ecological environment. Water pollution is to be prevented and controlled, with a view to protecting and improving water quality. Supervision and management of prevention and control of water pollution is to be strengthened. Water is to be conserved (arts. 5 to 7). Agriculture must be practised with a view to promoting stable and high agricultural yields (art. 15). Hydropower development is to be done in accordance with protection of the ecological environment (art. 16). Fish ladders must be constructed when needed (art. 18). Adverse environmental impacts resulting from the implementation of inter-basin transfers (art. 21) must be prevented. Additional rules control the disposal of refuse, mining activities, land reclamation, the protection of projects and the creation of management and safeguard zones (arts. 24 to 29).

28. The United States of America, in its Clean Water Act of 1972, regulated water quality to ensure that all waters received minimum protection. Individual states play a primary role in area-wide waste treatment and non-point pollution control and can also take over the enforcement and administration of the Act. The Act covers virtually all types of discharges into the waters of the United States of America and relies on water-quality standards and discharge permits tied to technological requirements for the treatment or elimination of different types of pollutants.

D. Enforcement provisions

29. As externalities become more common, grave and dangerous, the need for information, monitoring and remedial action is increasing. Water legislation has responded to that need through a variety of provisions.

30. Canada, in its Water Act of 1979, provided for the appointment of inspectors and analysts, who could enter places, facilities, premises and vehicles; examine waste, cleaning agents and water conditioners; examine containers; take samples; require information; and require and inspect books and documents. Inspectors are assisted in the performance of their functions. Obstruction of functions and false statements are prohibited (arts. 23 to 25). The Act also provides for fines, continuing offenses (each day to be considered a separate offence), issuance of refrain orders and other enforcement tools (arts. 28 to 35).

31. Germany, in its legislation, has provided for supervision of the equipment, facilities and processes relevant to water use. Such supervision includes rights of access and a requirement of information (art. 21).

32. The United Kingdom of Great Britain and Northern Ireland, in its Water Act of 1989, provided a comprehensive definition of the powers of the National Water Authority, including a general power to do everything incidental or conducive to the carrying out of its functions; fixing and recovering charges for services; instituting criminal proceedings; acquiring land; gaining entrance to premises; and taking samples (sect. 145). Additional powers include dealing with foul water and pollution, and carrying out works and surveys (sects. 154 to 165).

33. China, in its Water Law of 1988, required the cessation of unlawful activities, the removal of impediments and compensation for losses, within stipulated time-limits (arts. 44 and 45). Certain activities are fined, and functionaries and public officers are personally liable (art. 50).

34. The United States of America, in its Clean Water Act of 1972, provided for enforcement, including record-keeping; reporting; installing and using monitoring equipment; and sampling effluents. Records must be available to the public, except when they can be reasonably termed a trade secret. The Environmental Protection Agency has the authority to enter premises for inspection. Sanctions include notice of violation, administrative compliance and extension orders, civil actions, administrative penalties and criminal actions. The Administration can issue orders for administrative compliance, assess administrative penalties or initiate civil suits. Injunctions may be issued in cases of immediate, severe and proven threat to health. Criminal liability proceedings are instituted against responsible parties, including corporate officers, in cases of negligent or known violations. There are also provisions for acting in emergencies. The Act authorizes citizens' suits and contains a strict liability provision (sect. 311).

E. Protection and management of water supplies

35. The protection of water sources has been a traditional concern of water law. Increasing demand and externalities have strengthened this concern.

36. Germany, in its Water Law as amended on 23 September 1986, provided for the creation of water protection areas within which certain activities could not take place or certain measures must be tolerated (art. 19). The law requires the licensing of pipeline systems conveying substances constituting a hazard to water. Such licences are subject to conditions that can be changed even after a licence has been issued (art. 19). The use of and discharges into groundwater are subject to permit and licensing (arts. 32 and 34).

37. Groundwater is increasingly controlled and protected. A number of countries have enacted legislation that requires permits, creates administrative devices to control the use of groundwater in special management areas and restricts the expansion of high consumption activities such as irrigation. Management measures include the issuance of certifications of assured water supplies, which are required for the approval of subdivision plats; the

registration and recording of wells; the control of water storage and recovery; the control of well drillers; the protection of pre-existing uses; the use of groundwater charges; the measurement of withdrawals; estimations of supply and demand; stopping and reducing withdrawals in order to allow replenishment; granting emergency powers in case of drought; granting permits at the discretion of water administrators (except in cases of clear abuse of discretion); deadlines for waterworks and activities; monitoring; the possibility of amending and forfeiting water rights (previous hearing); the conjunctive use of surface and groundwater; the control of discharges into groundwater; and allocation of groundwater to preferred uses, such as drinking water supply. 5/ China provides for groundwater management and conjunctive use (art. 25).

38. The United Kingdom of Great Britain and Northern Ireland, in its Water Resources Act of 1991, provided that the National Rivers Authority should have a general mandate of proper management, including conserving, redistributing, augmenting and securing the proper use of the water supplies of England and Wales. Water-resources management schemes can be entered into for this purpose.

F. Conciliation of interests

39. Governments are resorting to conciliation mechanisms and preventive strategies in order to manage water-related differences and coordinate activities with a view to achieving the several objectives and satisfying the many demands that are usually associated with water resources.

40. The federal Government and the states of Australia signed an "Intergovernmental Agreement on the Environment" on 1 May 1992. The Agreement intends to provide a cooperative national approach to the environment; a better definition of the role of the respective governments; a reduction in the number of disputes; greater certainty; and better environmental protection. The Agreement acknowledges the role of state governments in developing national and international policies; the global character of environmental concerns; the need for ecologically sustainable development; the need to conserve and improve biota, soil and water resources; the relationship between efficiency and a clear definition of the roles of different levels of government; the need to have explicit accounts of costs and benefits; the relationship between effectiveness and cooperation; and the need for accountability.

41. The Agreement determines the responsibilities and interests that are common to all levels of government, as well as those that are the concern of specific levels of government (the commonwealth, the states, the local governments). It also states procedures for the accommodation of interests. Decision-making must include economic as well as environmental considerations, since strong, growing and diversified economies enhance the capacity for environmental protection; must apply the precautionary principle; must seek intergenerational equity; and must conserve biological diversity and ecological integrity. The "polluter pays" and "consumer pays" principles are endorsed. The schedules to the Agreement concern, inter alia, data collection and handling; resource assessment; land-use decisions and approval processes; environmental impact assessment; national environmental protection measures; climate change; biological diversity; national state; world heritage; and nature conservation.

42. Germany, in its Water Law as amended on 23 September 1986, provided for the reconciliation of rights and authorizations to use water when either the qualities or the quantities of existing supplies did not allow the satisfaction of all uses. Compensation can be paid (art. 18).

43. China, in its Water Law of 1988, provided for the settlement of disputes among districts through consultations, in a spirit of mutual understanding and accommodation, solidarity and cooperation. Only after consultation fails are disputes referred to the next level of government. Projects cannot be implemented while a dispute remains unsettled unless there is an agreement between the parties or an approval is granted by the next higher level of government (art. 35). Disputes between units, between units and individuals, or between individuals are to be resolved through consultations and mediation. Failing agreement on mediation and consultation, or if those are not successful, the dispute can be referred to adjudication by either the Administration or a court. Administrative decisions can be referred to a court when a party refuses to accept the administrative decision (art. 36). The water regime cannot be unilaterally altered pending a decision but temporary measures can be authorized by the Government.

44. Canada, in its Water Act of 1970, established a system of agreements between the federal Government and the provinces for the management of any waters where there were significant national interests. Programmes can be created to develop inventories of water resources; provide data; formulate comprehensive water-resources management plans; design projects for the efficient conservation, development and utilization of waters; and implement other plans and programmes (art. 4). In certain circumstances, such programmes can be undertaken directly by the federal Government (art. 5). Agreements cover, inter alia, the responsibilities of the parties; the allocation of costs and the terms of payment; the provision of labour, land and materials to be made by each party; the proportion of any compensations to be paid by each party; the conditions of loans, if any; the responsible authorities; and the general terms and conditions of the programme. There are also references to the conditions of the boards, commissions or other bodies to be created under the agreement, where applicable (art. 7). Water-quality management agreements are also provided for (art. 9). Under certain circumstances, the federal Government can create federal water-quality management programmes for inter-jurisdictional waters (art. 11).

G. Concern for international issues

45. Growing scarcity, competing demands and transfer of externalities occur not only within national boundaries but also at the international level. In addition, in common market areas differing regulations might either curb imports or give a competitive advantage to exports. Trends to privatize water-related services in many countries have, moreover, led to international opportunities for provision of advice, equipment and services.

46. Therefore, countries are increasingly referring to extraterritorial factors or elements in their national water legislation.

47. Germany, in its Water Law as amended on 23 September 1986, provided for the refusal of pipeline licences if there were concerns about parts of the pipeline that were constructed or operated outside the area of application of the Law (art. 19). Specific water-management schemes will be drawn up in order to fulfil international obligations (art. 36b).

48. The United Kingdom of Great Britain and Northern Ireland, in its Water Act of 1989, authorized the National Water Authority to provide international assistance, training and advice (sect. 144). The appropriate minister is granted powers to issue regulations to give effect to any community obligation and to any international agreement to which the United Kingdom is, for the time being, a party (sect. 171). The activities of water-service companies are affected by the requirements of directives of the European Community, such as those concerning drinking and bathing waters.

49. China, in its water legislation, provides for the possibility of conflict between national water law and treaties to which China is a party. In such cases, the provisions of international treaties or agreements are to prevail (art. 51).

50. Canada, in its Water Act of 1970, authorized the federal Government to directly undertake the formulation of plans and the design of projects, including implementation, with respect to any international or boundary waters where there was a significant national interest in such plans or programmes (art. 5).

H. Technical requirements

51. As water becomes scarcer in relation to demand and more vulnerable to environmental attacks, legislation tends to introduce specific technical requirements for the use and protection of water. Some countries have introduced legislation supporting the development of appropriate technologies.

52. Germany, in its Water Law as amended on 23 September 1986, provided for technical requirements, inter alia, in relation to pollution control (art. 7); construction and operation of waste-water facilities (art. 18); construction and operation of pipeline systems (art. 19); and facilities handling hazardous substances (art. 19q). It also provided for specialist firms (art. 191) and for the use of the most advanced scientific techniques in establishing procedures to measure the level of noxiousness of waste water and pollutants (Act on Waste-Water Charges of 6 November 1990, art. 3(4)).

53. Regulations concerning the implementation of the principles of "emission reduction" and "standstill", which are set out in the policies for pollution control of the Government of the Netherlands, are closely related to technological requirements. Thus, industries should select processes and conduct operations according to the principle of good housekeeping. For blacklisted substances, control must involve the use of the best technical means available. The objective is a zero-discharge situation. Hazardous substances not included in the blacklist should be controlled using the best practicable means. Continual improvement of technical means, including the removal of

organic micropollutants, accidental spills and nutrients, is taken into account. 6/

54. The United Kingdom of Great Britain and Northern Ireland, in its Water Act of 1989, endowed the National Water Authority with the responsibility for carrying out research and related activities in areas related to its functions, including collating and publishing information relevant to the determination of water supply and demand in England and Wales. Similar activities may be undertaken outside England and Wales (sect. 143).

55. China, in its Water Law of 1988, promoted comprehensive scientific investigation, survey and assessment in the development and utilization of water resources. Outstanding scientific and technical research is to be rewarded (arts. 8 and 10). All units of government shall adopt advanced technology in water conservation, reduce water consumption and raise the ratio of water reuse (art. 7). China also requires compliance with technical standards in the construction of waterworks (sect. 19).

I. Water planning

56. The development of water resources is no longer amenable to isolated action. Water legislation is rapidly evolving towards integrated water planning in order to satisfy environmental objectives, economic requirements and social concerns.

57. Germany, in its water legislation, requires a prior plan approval procedure before approving any substantial modifications of water bodies and their shores (art. 31). River basins and economic regions are to be subject to water plans in order to safeguard the water resources needed for economic improvement and protection of the quality of life. Plans must consider available water resources, flood control and protection against pollution, and must integrate water planning with regional planning. They are to be produced by the Länder according to federal directives (art. 36). Water-management schemes, also to be produced by the Länder, are to consider the role of water within ecosystems, the rational use of groundwater and the requirements of different uses (art. 36b). Plans are subject to adjustment and updating. They are implemented through a variety of means, including administrative requirements and the revocation of permits and licences (art. 36b).

58. The river basin and the region are increasingly the focus of water management, development and protection. In 1974, water in the United Kingdom of Great Britain and Northern Ireland was regionalized. Later, the provision of water-related services was privatized. 7/ The functions of the water authorities in relation to flood control, water pollution, the management of water resources, land drainage, salmon and freshwater fisheries, and navigation and recreation, were transferred to the National Rivers Authority. 8/ The Authority consults with and has the duty to consider representations of regional rivers advisory committees. 9/ Legislation also provides for the creation of regional flood defence committees and regional freshwater fisheries committees. 10/

59. In Europe, there is a trend to implement a double level of water-resources management: a regional level for water-basin plans, legal enforcement and incentive policies, and a local level for the operation of services and the implementation of innovative policies such as urban hydrology. 11/

60. While the role of regional and basin planning, control and management has been strengthened in Europe, the lack of adequate mechanisms for intersectoral planning and coordination at basin level seems to be negatively affecting water management in some countries. 12/

61. China, in its Water Law of 1988, required that the development and utilization of water and the prevention of disasters be planned in a comprehensive and systematic manner, with all relevant matters taken into account for multi-purpose development and maximum benefits, allowing full consideration of the many different functions of water (art. 4). Water allocation is to be planned (art. 7). Development and utilization of water, and control of disasters, are to be based on overall planning, with rivers or regions as basic units. There are comprehensive plans for the basins of major rivers and specialized plans for individual sectors. Comprehensive plans are to be coordinated with the National Land Plan and are to consider the demands of different regions and sectors. They are prepared by the departments of water resources at the different levels of government. Specialized plans are sectoral and are to be prepared by the departments concerned (art. 11). Remedial measures or compensation are required in cases of interference with existing developments (art. 20). Consultations are required for projects with intersectoral or interregional impacts (art. 22). There are provisions for the relocation of populations displaced by water projects (art. 23).

62. China, in its Water Law of 1988, also required that all levels of government take effective measures for flood control. Special administrative units are responsible for that activity, so-called flood control headquarters, which have the authority to requisition materials, equipment and manpower, subject to return after the emergency or compensation. Flood defence plans are to be integrated into river basin plans (principle: "ensuring the keys while taking the generals into account"). Land use is subject to the needs of flood control and protection. The traditional principles prohibiting the blockage of water (by downstream units or users) or the aggravation of risk by increasing the discharge (on the part of upstream units or users) are applied. Emergency measures are to be adopted and implemented according to plans, and cover, inter alia, safety, protection, evacuation, livelihood, rehabilitation and compensation for losses (arts. 38 to 43).

II. MARKETING AND SUBSIDIES

63. Marketing arrangements for water-related products, subsidies and water-rights markets are particularly relevant issues, all of which are receiving increased attention.

A. Markets for water-related outputs

64. It has been noted that investments to improve the efficiency of the use of irrigation water are related not only to water pricing but also to the economic benefits resulting from improved management and yields (in terms of output). 13/ Such economic benefits result from the existence of markets (effective demand) for the outputs of irrigation.

B. Water subsidies

65. It has been found that subsidizing water for some activities and types of use causes an unnatural excess of demand, with impacts on water use, the environment and water reserves. Some countries are considering and implementing legislation to lower subsidies to irrigation water. 14/ In at least one case, the lowering of subsidies has been prompted by water scarcity, the need to improve efficiency, and increased coordinated activities of interests other than agriculture (business, urban, environment). 15/ In some arid areas, new policies are emerging that advocate, inter alia, marketing water rights, reallocating water to higher value uses and seeking development alternatives that rely less on water. 16/

66. In at least one court case, an environmental impact assessment of environmental subsidies in irrigation has been requested. A federal judge in California ordered an environmental review of rules limiting the number of acres farmers in the western United States of America could irrigate with federally subsidized water. The Bureau of Reclamation is to study the effects of a set of rules and regulations that it enacted in 1987 to put into effect the Reclamation Reform Act of 1982. The rules were challenged by environmental groups, which argued that the rules allowed large farms to continue using subsidized water, defeating the purpose of the reclamation project, which was to provide cheap water to family farms and did not properly assess their environmental impact. The Reclamation Policy of 1902 had provided water below market prices with a view to increasing agricultural output and encouraging the creation of family farms. Leasing arrangements and other devices had been used to bypass the limitations on acreage, which were intended to promote family farming, so that subsidies had in fact been granted to very large farming operations. The 1982 Act had required that water provided to agricultural holdings exceeding the legal limit be provided at full cost. The Bureau of Reclamation subsequently enacted regulations to implement the Act. Those regulations were found to have no significant impact, however, and were therefore not subjected to environmental impact assessment. That finding was challenged by the court, which found that the regulations were a major federal action with a potential to significantly affect the human environment. The court objected to the use of purely economic notions, such as rational utility maximizer, which it found theoretical, far removed from reality and in violation of the regulations, which require an interdisciplinary approach. An environmental impact review was therefore requested. 17/

C. Marketing water rights

67. Water-rights markets are increasingly being considered as a policy alternative to encourage the optimal use of scarce water resources. They also provide a means of postponing the development of costly new supplies. Water markets are a distinctive characteristic of water use in the western United States of America.

68. In Colorado, Nevada and Utah, water rights can be sold and bought separately from land. In other states, such as Arizona, water is acquired as an appurtenance to land. The reallocation of water rights, with the possible exception of water quality, may be the most pressing matter facing the arid west. 18/ For a reallocation to occur, water rights must have been beneficially used and must continue to be beneficially used after the reallocation. Such reallocation must not affect other users and must be in the public interest. In many jurisdictions, inter-basin transfers or transfer outside the area of origin can only take place after due consideration of local interests. In some jurisdictions, appurtenance statutes prevent water reallocation. 19/ The marketing of water rights is affected by the priority of the transacted right, the profile of the parties, geographic flexibility, the size of the transaction, dates, the reliability of water rights, flexibility in purpose and place of use, buyer characteristics, the volume of water transferred, changes in regional economies etc. 20/

69. While water-rights markets are strongly advocated by most reputable experts, some have reservations. Conflicts over water transfers are occurring in the western United States of America as large cities seek water supplies in rural areas. The public values at stake include the economic development of urban areas and the culture, way of life, environment and future of rural communities built around agricultural uses. It is becoming increasingly apparent that current water law and water market oriented behaviour are incapable of solving the conflict in an equitable manner. 21/ Therefore, according to some authorities, oversight and regulatory approval for water transfers and markets is required. 22/

70. Water markets in developing countries are still incipient. However, there are some experiences worth bringing to the attention of the Committee. In a 1981 law, Chile authorized water transfers and the marketing of water rights (arts. 6 and 21). The marketing of water rights has also been endorsed by Peru in a draft water law (arts. 26 to 29). Early assessments of the performance of the marketing of water rights in Chile indicate that market mechanisms within the research area may not have been fully operational due to difficulties in assigning a value to water rights and also due to some constraints in the institutional environment; water transactions have been quite limited. 23/

71. The lack of effective operation of market mechanisms has been attributed to constraints or transaction costs, including the rigidity of irrigation systems; the lack of storage capacity; the uncoordinated and outdated titling system; lack of legal knowledge; and cultural resistance. In addition, the market and legal systems do not have penalties for inefficient, inadequate or non-effective use of water rights: water rights are free of charge and there are no sanctions for lack of use. In contrast, in the western United States of America, there is

a requirement for effective and beneficial use of water, which is the cornerstone of the system.

72. Accordingly, market incentives for water transactions may not in fact have encouraged efficiency in the use of water in Chile. The investments that have taken place may have been prompted by expected gains resulting from the yields of water use. It has been noted that increased investments in irrigation might be due to the legislation of subsidies for irrigation development (law 18. 450/1985). That legislation authorized subsidies for up to 75 per cent of investments for a period of eight years (art. 1). There have also been questions concerning the equity of the system. It has been found that the impact might have been negative, since small and medium-sized farmers did not have adequate information or enough resources to take full advantage of the system. Low-income farmers did not in fact benefit from the system. If they had rights, they often lost them because they did not know what to do to protect them; if they did not have water rights, they did not obtain new rights because they did not know what to do to obtain them. 24/ The issue of distribution has also been considered by the World Bank, in its First Annual Report on the Environment and its working paper entitled "Allocation, distribution and scale as determinants of environmental degradation". 25/

III. FUNCTIONAL ORGANIZATION AND ADMINISTRATION

A. Vesting responsibility for overall water management

73. The functional organization of policy-making, water allocation, water management and the monitoring of users plays an important role in the implementation of a sustainable water development system. Where such functions are vested in institutions with functional responsibilities for specific water uses or discrete economic activities, water planning and management might not be objective. In such cases, each concerned party might tend to support projects or allocation of waters according to vested functional interests, without regard to the source of supply or the soundness of investments and projects.

74. To avoid such problems, many jurisdictions have allocated responsibility for policy-making, water allocation and programme and project evaluation to a non-user-agency or ministry. A recent publication of the World Bank emphasizes the need to separate policy, planning and regulatory functions from operational functions at each level of government. In so doing, the Bank agrees with the National Water Commission of the United States of America, which in 1972 was already recommending that policy planning and sectoral planning must be separated from functional planning, design and construction, as well as from operation by action agencies. 26/

75. In a majority of states in the United States of America, water planning and allocation are separate from functional, discrete and sectoral activities. However, in Kansas, the Division of Water Resources is under the authority of the State Board of Agriculture. In most states, water use is regulated by organizations dealing with either natural resources, the environment or water resources as a separate entity. 27/ A similar pattern is found in Canada and its provinces. 28/

76. Some Middle Eastern countries, such as Oman, have created ministries of water resources in an effort to improve the management of scarce and imperiled water resources. Such ministries are separate from functional, sectoral water activities, their main function being overall water management. 29/ Other Middle Eastern countries, such as Yemen, are at present considering the adjustment of their institutional systems to the needs posed by adequate water resources management. A Yemeni authority states that responsibility for water management at the national level is to be delegated not to a water-using sector but to a central independent authority. 30/

77. In Israel, the Ministry of the Environment has partial authority over the Water Commission and is responsible for the application and enforcement of the water-pollution mitigation provisions of the water law. 31/ Hungary has created a Ministry of Environment and Water Resources.

78. Changes in the European context include the reorganization of water management in the United Kingdom of Great Britain and Northern Ireland, which has separated water services from planning, control and regulation. Water services are produced by private limited companies, while water management and control are the responsibility of such public organizations as the National Rivers Authority and the Office of Water Services. 8/, 32/

79. China, in its Water Law of 1988, entrusted national long-term water planning to the Ministry of Water Resources. The Ministry was created as a response to the problems created by a fragmented institutional system, in which water had been managed by sectoral ministries, including the ministries of agriculture, industry, communication and construction. That fragmented use-oriented institutional system had resulted in imbalances between supply and demand, water pollution, reduced flood-discharging capacities, overdraft of groundwater, intractable and protracted water disputes and ecological deterioration. Water resources units have also been created at the local level. 33/

80. In the Netherlands, the central Government manages the most important surface waters (State waters) and determines the general policy, while local authorities and public bodies are responsible for regional waters, drinking-water supply, sewer systems and municipal waste-water treatment. There is a process for transferring functions to the regional level (police power and planning) as a tool for fostering a more integrated approach to water-resources management. Therefore, water planning in the Netherlands is a multi-party process that includes the central, regional and local levels of government for both surface water and groundwater, and quantitative and qualitative matters. 34/

81. Guatemala recently created a Water Resources secretariat, which has overall responsibilities for water planning and policy-making. Brazil is considering the implementation of a national water management system, which would include a national water resources council responsible for national water policy; the arbitration of conflicts; national water planning; amendments to water legislation; and other functions. The system is still under consideration and is being devised to satisfy a constitutional mandate. The main purpose of the process is to overcome the traditional conflicts and limitations imposed by a

system in which main water sectors have so far been entrusted to different functional ministries, thus fragmenting water management. The proposed system relies mainly on the river basin as the appropriate unit for water management. 35/

B. Transferring services to the private sector

82. There is also a trend to transfer responsibility for water-related services to provincial and local levels of government and the private sector. A main point to note in that regard is that transfers might not be successful if they are not accompanied by adequate economic and financial resources at provincial and local levels.

83. The United Kingdom of Great Britain and Northern Ireland has transferred water supply and sewerage to private-sector limited companies. Principles applicable to private undertakers have resulted, inter alia, from that country's Water Act of 1989, its Water Industry Act of 1991 and its Water Resources Act of 1991. The transfer was a complex process involving technical, institutional, economic and financial considerations. Regulatory bodies were created, separating regulation and policy from operations and undertakers. The purposes of the regulators are to assure that drinking water supply and sewerage are properly carried out; that undertakers are able to finance the proper carrying out of their functions; that the interests of customers are protected (charges, supplies and quality of services); and that services are economically and efficiently provided under conditions of effective competition. There is, therefore, a very distinctive concern for the financial and technical qualifications of water and sewerage undertakers. The system must fulfil certain duties in relation to environmental and recreational objectives. Water must be wholesome at the time of supply; if not, there are provisions for enforcement action. Sewerage systems are subject to special pollution and quality regulations. Charges are regulated in the conditions of the appointment of each undertaker. There are provisions for the appointment of special administrators in order to assure the continuity of the services provided by companies undergoing difficulties. The stock of the companies is subject to quotas, which assures on the one hand a minimum of coherence and on the other an acceptable level of widespread public ownership. Some shares can only be held by the public sector in order to represent certain public interests. 36/ There are also rules on the metering of water services.

84. Concerns about the technical and financial qualifications of purveyors of water services are clearly exemplified by the regulations in force in the State of New York in the United States of America. As a principle, services must be safe and adequate; must charge just and reasonable rates; and must operate without unjust discrimination and unreasonable preferences. Metering is considered to be instrumental in securing adequate water supplies, protecting the resource base and maintaining high standards of public health. The system allows differential charges for different manners, places, times and magnitudes of use. It contains detailed provisions on the financial and economic practices of public utilities providing water-related services. Financial monitoring covers charges, control of stock, bonds and loans. Financial rules also determine the purposes for which a utility can incur debt, regulate the

ownership of stock within public utilities and control the transfer of property. It is considered that the solvency of public utilities is clearly related to their ability to provide the public services under their responsibility. 37/

85. The movement towards decentralization and privatization of services has resulted in worldwide opportunities for companies specializing in drinking-water supply and sanitation services. Thus, an international consortium has recently won the privatization bid of Obras Sanitarias de la Nación in Argentina. The objectives of the process are to guarantee the maintenance and expansion of drinking-water supply and sanitation services; to assure the continuity and quality of the services; to protect the rights of the users; to assure an adequate regimen of operation; and to protect public health, water resources and the environment. The provision of the services is monitored by a regulatory commission, the members of which have a guaranteed term of tenure. Undertakers have to have proven experience and technical and financial capacity. Metering is requested for non-residential uses and block deliveries. Prices and tariffs must reflect the economic cost of providing the service, allowing benefits for the undertaker, including expansion costs, and assuring operation and maintenance. The tariff allows cross-subsidies. There are provisions on competent jurisdiction (the federal courts) and on the use of arbitration and mediation.

C. Assessment of water projects and programmes

86. The soundness of investments in water-related projects, programmes and uses is significantly enhanced if investments are made subject to both a compulsory assessment of economic, social and environmental feasibility and a sustainability analysis.

87. The National Water Resources Council of the United States of America has prepared a number of proposed principles and standards for planning water and related land resources, which provide a good example of a multidisciplinary assessment of water plans. The principles call for the implementation of a system to display the relevant beneficial or adverse effects of water plans. Consequently, water planning is to be assessed according to the effects that alternative plans might have on objectives of national economic development, environmental quality, regional development and social matters. 38/

88. The United States of America, in its National Environmental Protection Act of 1969, required that federal agencies include an environmental impact statement for every major federal action significantly affecting the quality of the human environment. The Act has been used to bring water-related cases to the courts (concerning dam and reservoir construction, dredge and fill, flood control, ocean dumping, rivers and harbours projects, and wetlands and water pollution).

89. In the Netherlands, activities requiring environmental impact statements include discharges into surface and groundwater; interfering with the groundwater table; the construction, widening or deepening of navigable waterways; diverting navigable natural waterways; the construction of naval

ports; the construction of main water pipelines; the construction of marinas, dykes and dams; land reclamation; and the construction of water reservoirs. 39/

90. The European Community, in directive 85/337/EEC, required environmental impact statements for trading ports and inland waterways. In the United Kingdom of Great Britain and Northern Ireland, new manufacturing plants discharging into water with the consent of the water authority might be required to produce an environmental impact statement. 40/

91. In its procedures for preparing environmental impact statements, Norway requires that all major physical developments be assessed for possible impacts on the environment, natural resources and society. 41/ Some countries have established types of areas within which projects or programmes are presumed to have significant environmental effects. In Finland, such areas include a number of areas protected by the Wild and Scenic Rivers Conservation Act as well as groundwater protection areas. The criterion of sensitive areas is also utilized in land planning. Poland has identified the disturbance of water regime and intakes as one of the factors likely to produce environmental disturbance. 42/

92. Canada, in its Environmental Assessment Act of 1992, aimed to ensure that the environmental effects of projects were carefully considered; that sustainable development was promoted for a healthy environment and a healthy economy; that projects did not cause significant adverse environmental effects; and that the public participated. The projects to be assessed include those proposed or financially assisted by the federal agencies; those that involve lands administered by federal agencies; or those that require permits, licences, approvals or enabling actions of federal agencies (art. 5). Therefore, the Act applies to projects in which the federal Government has a decision-making authority. Assessments are to be carried out as early as possible (art. 11). The Act is to be implemented through four regulations: the Inclusion List (physical activities); the Exclusion List (insignificant environmental effects); the Law List (functions, powers and duties whose exercise requires assessment); and the Comprehensive Study List (significant environmental effects). The Law List includes several water-related enactments, such as the Navigable Waters Protection Act and the International Rivers Improvement Regulations.

93. The Comprehensive Study List includes water-related activities, such as dams in national parks and protected areas; hydroelectric generating stations with more than 300 megawatts of production capacity; certain categories of water projects; offshore oil, gas and minerals projects; and certain transportation facilities.

D. Information, records, mapping

94. To be effective, a system for the planning and management of water resources must be able to provide information on the nature and quality of water, where it is available, who is using it and what they are using it for. Therefore, effective water-management systems require adequate official surveys, inventories and cadastres of water sources and water-supplies; they also require up-to-date registers and records of water uses and discharges into waters, water

rights and the beneficiaries of such rights, with their respective water allocations.

95. Germany, in its Water Law as amended on 23 September 1986, required the registration of water rights within a determined period of time. Lack of registration may result in the forfeiture of non-recorded rights (art. 16). The Register is to record permits and licences; existing rights and authorities; water-protection areas; and flood plains (art. 37).

96. The United Kingdom of Great Britain and Northern Ireland, in its Water Law of 1989, provided for registers with notices of water-quality objectives, applications, consents, certifications, water samples etc. The registers are to be available for inspection by the public free of charge. Members of the public can obtain copies of entries for a reasonable fee (sect. 117). In its legislation, the United Kingdom also requires that the National Water Authority and every water undertaker keep records of underground works and maps of water mains and sewers, and that such information be made available to the public free of charge (sect. 165). In its Water Resources Act of 1991, the United Kingdom created registers of abstraction and impoundment licences, pollution control and discharge works, as well as mapping systems of freshwater limits, main rivers and waterworks (sects. 191 to 195).

97. The objective of providing such information is to allow informed decisions by policy makers, administrators, managers, users and the public. Therefore, legislation requiring the submission of information by managers to policy makers, users and the public, and by users and the public to managers, is distinctive of modern water law. In its Water Resources Act of 1991, the United Kingdom required the National Rivers Authority to provide information to policy makers and undertakers, as well as to the public (sects. 196 to 197). The Authority, in turn, has powers to obtain information about surface water and groundwater. Information is to be timely and adequate and there are provisions on the kind of information to be collected and the manner in which the information must be organized (sects. 197 to 203). The system is complemented with norms on confidential and reserved information and penalties for false statements (sects. 205 and 206). Public participation is sought through a system of enquiries (sects. 213 to 215).

98. Canada, in its Water Act of 1970, set up public information programmes under which the public is informed about water conservation, development and utilization (art. 27). The Act also requires that the minister responsible for water inform the Parliament each fiscal year of the operations carried out under the Act (art. 36).

Notes

1/ "Water management in the Netherlands: policy, measures, funding" (November 1991), p. 4.

2/ Código de Aguas de Chile, ed. oficial (Dic. 408/1988) and Proyecto de Código de Aguas para el Perú (1993).

3/ "Water management in the Netherlands ...", p. 5.

4/ Ibid., pp. 8-9.

5/ Space limitations prevent a full listing of laws and countries in the text. For more detailed information about current practices in groundwater management, see Robert E. Beck, ed., Water and Water Rights (Charlottesville, the Michie Company, 1991); and Economic Commission for Europe, "Groundwater legislation in the ECE region" (ECE/WATER/44).

6/ "Water management in the Netherlands ...", pp. 9-10.

7/ Bernard Barraque, "Water resources management in Europe: beyond the privatization debate", Flux (Paris), January-March 1992, p. 9.

8/ Government of the United Kingdom of Great Britain and Northern Ireland, Laws of England, 4th ed., suppl., vol. 49, paras. 201-218, p. 49/6.

9/ Government of the United Kingdom of Great Britain and Northern Ireland, Water Act of 1989, sect. 2.

10/ Government of the United Kingdom of Great Britain and Northern Ireland, Water Act of 1989, sects. 136, 137 and 141, and Water Resources Act of 1991, sects. 6 to 14.

11/ Barraque, op. cit., p. 22.

12/ Carl J. Bauer, "Derechos de propiedad y el mercado en una institucionalidad neoliberal: efectos e implicancias del código chilena de aguas de 1981" (Santiago, August 1993), pp. 3-4.

13/ Bauer, op. cit., p. 2.

14/ Ilter Turan, "Politics of water and the role of international organizations: the Middle East", in Proceedings of the International Symposium on Water Resources in the Middle East: Policy and Institutional Aspects (Urbana, Illinois, 1993), p. 152; Henry Kamm, "Israel's farming success drains it of water", The New York Times, 21 April 1991, p. Y-7; and Robert Rehinhold, "New age for western water policy: less for the farm, more for the city", The New York Times, 11 October 1992.

15/ Richard Conniff, "California: desert in disguise" in Water: The Power, Promise and Turmoil of North America's Fresh Water, special ed. (Washington, D.C., 1993), p. 49.

16/ Marcus Amy Dockser, "Israeli scientists search for a solution to water crisis, pivotal in peace talks", Wall Street Journal, 16 November 1992, p. A 10; and Salameh Elias, quoted by Vesiling J. Pritt in "The Middle East Water: critical resource", National Geographic (Washington, D.C.), May 1993, p. 59.

17/ Natural Resources Defense Council v. Duvall, United States District Court, E.D. California (777 F.Supp. 1533, E.D.Cal 1991); and "Federal judge

orders review of rules on irrigation water", The New York Times, 1 August 1991, p. A 14.

18/ Beck, op. cit., vol. 2, p. 234.

19/ Ibid.

20/ Bonnie G. Colby et al., "Water rights transactions: market values and price dispersion" in Water Resources Research, vol. 29., No. 6 (June 1993), pp. 1565-1572.

21/ Helen M. Ingram et al., "The trust doctrine and community values in water", paper presented at the Third World Conference on Water Law and Administration, Alicante-Valencia, Spain, 1989, p. 10.

22/ Ibid., p. 11.

23/ Bauer, op. cit., p. 1.

24/ Bauer, op. cit., p. 3.

25/ World Bank, The World Bank and the Environment: First Annual Report (Washington, D.C., 1990), pp. 42-44.

26/ World Bank, "Water resources management", World Bank Policy Paper (Washington, D.C. 1993), p. 45; and Government of the United States of America, National Water Commission, Water Resources Planning (United States Department of Commerce, Springfield, Virginia, 1972).

27/ Beck, op. cit., vol. 6, "State Surveys".

28/ Government of Canada, Environmental Conservation Service, "Major Water-related Legislation and Institutions in Canada", paper prepared for the Committee on Natural Resources of the Economic and Social Council (October 1993), p. 20.

29/ Government of Oman, Ministry of Information, Oman '90 (1990), p. 115.

30/ Mohammed Al-Eryani, "Policy and institutional aspects of water resources management and development in Yemen", in Water Resources in the Middle East: Policy and Institutional Aspects (Urbana, Illinois, 1993), p. 159.

31/ Government of Israel, "The environment in Israel", national report submitted to the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992, pp. 6 and 119.

32/ Barraque, op. cit., p. 7.

33/ Ke Lidan, Water Resources Administration in China and Water Law of the People's Republic of China (1988).

34/ See "Water Management in the Netherlands ..."; and Barraque, op. cit., p. 16.

35/ Government of Brazil, Law Proposal No. 2249-A, 1991, and substitutive, June 1993.

36/ The Water Share Offers: Prospectus, Offers for Share (London, Schoeders, on behalf of the Secretary of State for the Environment and the Secretary of State for Wales, 1989), pp. 1-89.

37/ New York Consolidated Laws Service, cumulative suppl., vol. 26 (December 1992), pp. 75-82.

38/ Water Resources Council, "Proposed Principles and Standards for Planning Water Management and Related Natural Resources", Federal Register (Washington, D.C.), vol. 36, No. 245 (21 December 1971), pp. 24145-24146.

39/ Economic Commission for Europe, "Policies and systems of environmental impact assessment", Environmental Series, No. 4 (ECE/ENVWA/15), p. 39.

40/ Ibid., p. 43.

41/ Ibid., p. 9.

42/ Ibid., p. 28.